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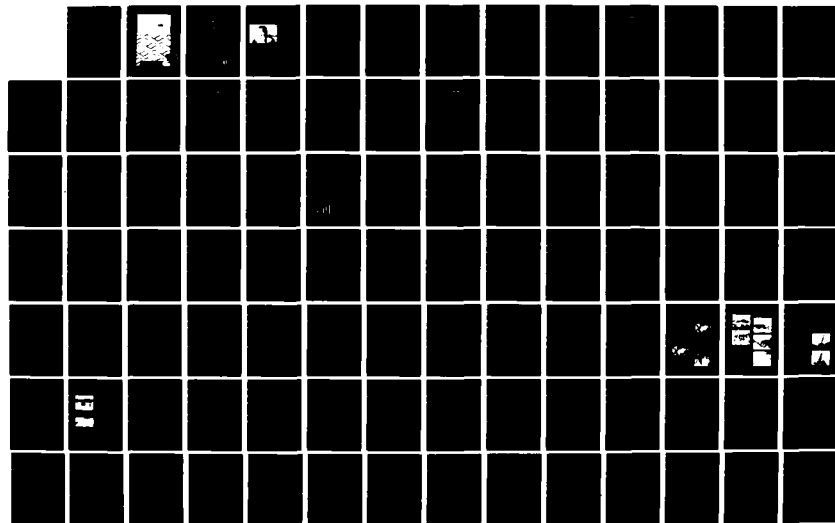
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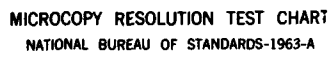
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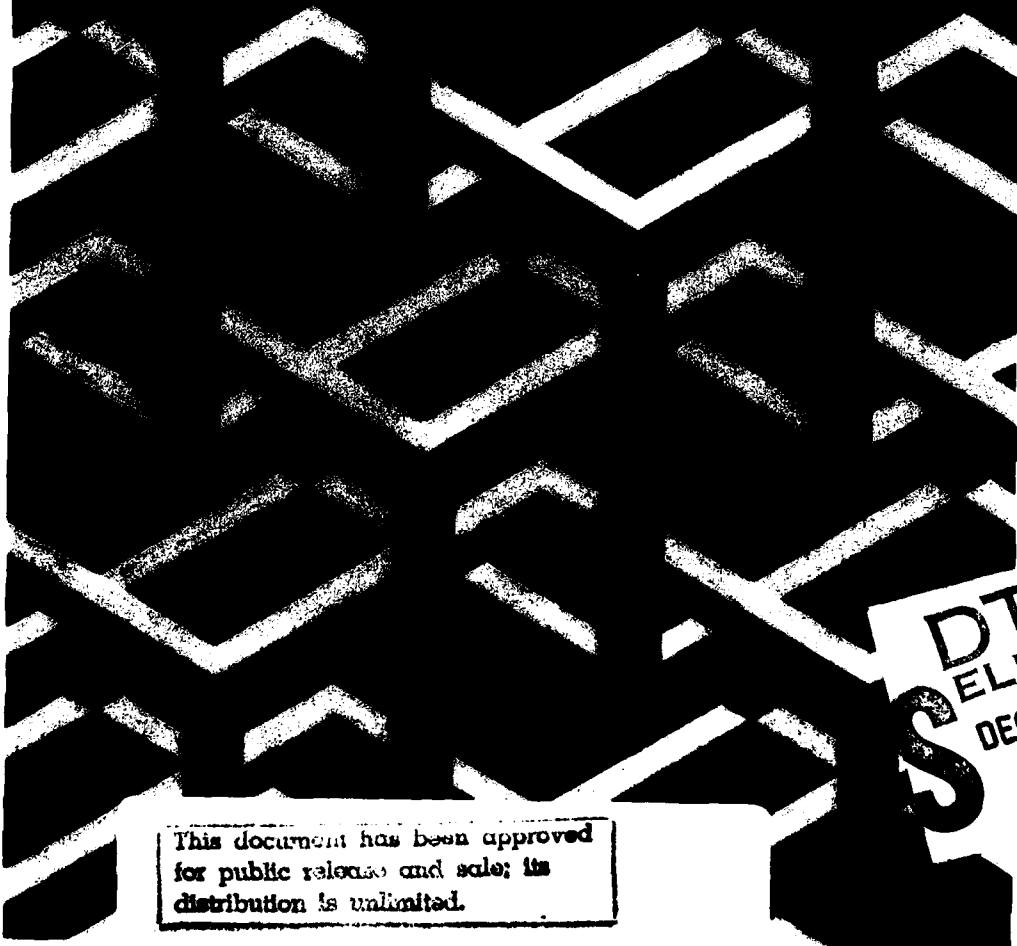
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Strategic Nuclear Policies, Weapons, and the C<sup>3</sup> Connection



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# NATIONAL SECURITY ISSUES 1981 SYMPOSIUM

**Strategic Nuclear Policies, Weapons, and the C<sup>3</sup> Connection**

*F19628-82-C-0001*



Symposium Officers:  
Col. Lloyd L. Moir, USAF  
Dr. Barry M. Horowitz

October 13-14, 1981

Cosponsored by The Electronic Systems Division, USAF,  
Hanscom Air Force Base, Massachusetts  
and The MITRE Corporation, Bedford, Massachusetts.

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**ESD-MITRE**







## Foreword

→ The US Air Force's Electronic Systems Division (ESD) and The MITRE Corporation cosponsored their first annual National Security Issues Symposium on October 13 and 14, 1981. The focus of the meeting was Strategic Nuclear Policy, Weapons and the C<sub>3</sub>I Connection. The symposium occurred during the period when the National Command Authority was making an overall reevaluation of its nuclear policies, including decision-making on the B-1 bomber, the MX missile system, the Trident system, and the improvement of command, control and communications systems. Many of our country's key professionals who participated in these decisions also participated in the symposium. The

group of speakers represented the military, academic, government and business communities and was, in my opinion, one of the best ever assembled to discuss this important subject.

The results of the symposium were gratifying. We spent two stimulating and productive days discussing the strategic nuclear issue, and everyone came away with a better understanding of the overall subject. In view of the importance of the material discussed at the symposium, I believe the proceedings valuable. We recorded the talks and the question-and-answer sessions that followed, transcribed them and now present them to you in these proceedings. I hope you find them useful.

Command Control Communications  
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# Opening Remarks

## Lt. Gen. James W. Stansberry, USAF

**Commander, Electronic Systems Division  
Air Force Systems Command**

**O**n behalf of the Electronic Systems Division, I welcome you to what I believe is the first National Security Symposium of this sort. It's certainly the first ever held in this area. I would like to steal a line from a former President: "I believe that possibly this is the greatest collection of talent ever assembled in one room (at least on this topic) since Thomas Jefferson dined alone at Monticello." Frankly, we started off very pleased with the response that we were receiving to our invitations. Our pleasure went quickly to awe, and at the moment we feel somewhat overwhelmed. It couldn't have happened at a better time for our Nation or for the Air Force, since the President has called for a resurgence, a moving forward in the area of C<sup>3</sup>; and, in particular, strategic C<sup>3</sup>. Only a matter of days ago we were accused of having been in on the deal all along. Somebody said to me, "How in the world did

you manage to time this symposium to follow so closely the President's announcement?" And I replied modestly, "All proper planning."

There is a good deal of serendipity at work this morning. We are delighted that we have so many people representing so many disciplines looking at the whole issue of our strategic forces and the C<sup>3</sup> necessary to command them, to control them, and to communicate with them. When planning for this symposium was started, we thought it necessary to beat the drums for C<sup>3</sup> (Command, Control, and Communications). Our worry was that, with all of the money and resources going into the muscle of our national security, perhaps the central nervous system, C<sup>3</sup>, would get short shrift; we might build all these systems and not pay enough attention to the equipment that processes the procedures, and to the hardware needed to effectively employ those procedures in peace and in war.

**Lt. Gen. James W. Stansberry, USAF**

We thought that this would be a good time to bring together the right people who worry about such things. Additionally, we were being a little selfish. Sometimes we at the Electronic Systems Division feel that we are not very well known in this area. So we invited many people from Boston and the Massachusetts area, to relate to them the important role that this state and New England play in national defense efforts. And as national issues have come into focus with respect to the MX, the B-1 bomber, and other strategic systems, we thought this to be an ideal time to determine what is really needed.

On behalf of the 800 officers, the 800 airmen, and thousands of civilians here at ESD who represent a center of expertise on C<sup>3</sup>, I extend to you our warm-

est welcome. I have hopes that this meeting will have a tremendous impact during the days ahead as we try to structure improvements in Command, Control, and Communications.

I would like to say one thing about MITRE. From time to time it's fashionable to pick at FCRCs (Federal Contract Research Centers), to deplore the fact that not every job goes to private industry. But I want to tell each of you that without MITRE and without MITRE's systems engineering capability, there would be no Electronic Systems Division. MITRE is a full-fledged member of the team here at ESD. We enjoy the best of relationships. ESD is truly in a partnership with MITRE in trying to do what is needed for the security of this country.

# Opening Remarks

**Robert R. Everett**

**President, The MITRE Corporation**

I was asked to say something about policy, weapons systems, and C<sup>3</sup> relationships. And that gave me a little trouble, because it seems to me that the relationships are so obvious, so intermingled, that it's hardly possible to say anything about them. But I worked at it for a while and I will say a few things.

For instance, we usually say something like "Well, policy comes first, and based on that we'll buy the weapons and we'll buy whatever C<sup>3</sup> is necessary to go with the weapons." But life is really much more complicated than that. We are involved in the development of C<sup>3</sup> systems for many operations. They are a large responsibility. We don't determine the policy, but we can certainly limit or constrain the policy; and I think that's one of our major problems — not just to do what appears to be necessary at the moment, or build those things that we're asked to build, but to try to do our planning and our development in such a way that we

provide our leaders of the future with the options and capabilities they will need. If we don't do that, the country may have to pay a high price.

The President has recently made some strong statements about strategic policy, and I'll say a couple of words about some of them. One thing he emphasized is the need to be able to fight a nuclear war. We really mean to have deterrents. Now war fighting is a very complicated business, and nuclear war fighting is even more complicated. And that means that not only must our strategic weapons and command and control systems survive long enough to inflict massive damage on the attackers, but that they must also have the ability to endure for a prolonged conflict.

What does this mean? We often think of strategic forces and strategic capabilities as one matter, and all the other military and civil facilities in the nation as another. This is wrong. When talking about strategic war fighting, we must recognize that the

tactical forces also have an important job to play, and that they must endure as well. The population of the United States must be protected; the national infrastructure and the fundamental services must be protected as well.

We must renew our interest in air defense and civil defense. Air defense hasn't seemed very important because we haven't expected an air attack early in the conflict. But in a prolonged conflict, we must expect that airplanes will come, and we must be able to do something about them. Therefore we not only must build air defense systems, we must build enduring air defense systems. And we must build enduring warning and surveillance and control systems to go with them.

Civil defense is another poor relation, thought of as a kind of welfare for the populace. If we must fight a prolonged war, then it's necessary not only to protect the populace but to protect the key workers, the key facilities, the production and reconstitution facilities, and things of that sort. All of these must be carefully thought through.

As I said, when thinking about strategic forces we sometimes think about them as being separate. We also tend to think of them as pieces of dedicated strategic hardware: missiles and satellites, or radio satellites, things of that sort. It seems to me that we really must think of them as capabilities and not just as hardware. The hardware, along with all the procedures and training and so on that go with them, make up the capabilities. Also, we can't just depend on a small number of dedicated

assets. We tend to ignore the large number of soft assets that exist in the country. For instance, the country is knee-deep in communications of all sorts. We tend to ignore that when we talk about strategic communications and surviving communications.

We must consider these issues. We must look at all of the communications that are necessary not only for strategic purposes but, as I said earlier, for reconstituting the economy and the government. We must define and build the kind of C<sup>3</sup> which will support the strategic policy of the nation, not only today but in whatever form it may take in five, ten, or 15 years when these systems will appear and be useful. It is necessary that we put survivability high on our priority list. It is necessary that we design these things so that they are flexible and are not just optimized for some particular purpose. We have to pay more attention to redundancy, proliferation and diversity. We have to aim for enduring capabilities rather than enduring facilities, and we have to test everything as thoroughly and realistically as we can during peacetime so that it will work if we ever need it. Many of these ideas are self-evident. They're often given lip service, but their implementation is not well suited to many of the current DOD organizations and procedures, and it may be that we need the kind of innovation, planning, imagination, development, and experiment in our acquisition systems that we expect to get in our technical systems.



# Keynote Address

## Gen. Robert T. Marsh, USAF

**Commander, Air Force Systems Command**

**I**t is good to be back among so many of my old friends. And, of course, it's especially good to share with such a distinguished group some thoughts on national security. I guess this truly does promise to be an outstanding event, and I think Jim Stansberry and Bob Everett really deserve our thanks for putting it together. I know that we have here some of the foremost experts on strategic policy. I'm also pleased to hear that we have such a fine cross-section of the Boston community represented; I think it is important for Hanscom Air Force Base and for the national security interest to share these views with so many from the Boston area.

To many ways of thinking there is no better way to gain national support for defense than to have a fully informed public aware of the critical problems that we face. Exposure to the thoughts of experts like these gathered here today is the best way I know for the public to receive a balanced view on the issues. And, as we've heard, the timing of this symposium could not be better, following as it does the President's recent decisions on strategic initiatives.

After many years of relative neglect we're finally getting underway with an effort to revitalize our strategic deterrence systems. Still, these new strategic initiatives will be subject to hot debate during the coming months. I'm sure many of you in this room will be active participants in that debate, and surely the sessions for the next several days will give you ample opportunity to explore the issues. I would like to set the stage for that exploration by reviewing the growing Soviet threat and discussing the President's program for correcting deficiencies in our U.S. strategic system. Then I'll offer you several challenges for your consideration.

I believe it is essential to back away occasionally and view the overall context of balance in perspective, for only then do the tremendous challenges we face come into focus. A review of the last 20 years reveals a dramatic change in the balance of power between the U.S. and the U.S.S.R. In the early '60s the U.S. enjoyed undisputed strategic superiority. But by the end of the '60s it was clear a change was in the wind. Perhaps one could view the Cuban missile crisis in '62 as a point of departure. Remember, we told the Russians to get their offensive

weapons out of Cuba, and they had little choice but to do so. It's hard for us to realize the extent of their international embarrassment and loss of face in having to back down. But it is clear that that event triggered a Soviet resolve never to suffer a repeat. A quote from Chairman Brezhnev, talking somewhat later, in 1973, reveals their intent. He said, "A decisive shift in the balance of forces will be such that, come 1985, we will have forces to exert our will wherever we need to." To make this prediction a reality, the Soviet Union embarked on an astounding defense modernization and expansion program which continues unabated today.

Look at how things have changed. In 1962 we outspent the Russians by 30 percent or more on defense. In terms of 1982 dollars, we were spending some 170 billion versus their 130 billion. Not so any more. By the end of the 1960s the combination of increased Soviet emphasis and our declining emphasis on defense caused the two military spending curves to cross. In 1969 the Soviets matched U.S. spending. From there on they have consistently outstripped us. During the last decade, they spent over \$450 billion more on defense than we did. The Soviets now commit about 13 percent of their gross national product to defense. The U.S. figure is five percent. What better indication of resolve and intent can there be than to see a country with severe domestic economic difficulties devoting more of its scarce resources for defense than the richest nation in the world?

I admit that dollar comparisons alone can be misleading. But my point is borne out by an examination of what the outlay of over \$450 billion in excess of ours bought for the Soviets in manpower, equipment, and plant capacity. The U.S. and the Russians each had about three and a third million men and women under arms in 1970. Today we have two million, while they have almost five million. They outproduce us in almost every area. Eleven and one-half to one in armored vehicles and artillery tubes, 18 to 1 in surface-to-air missiles, 3 to 1 in helicopters, and 2 to 1 in submarines, naval service combatant ships and tactical fighters. They

have developed three new types of ICBMs since we introduced our last one. They have deployed over 600 new ICBMs since we put our last Minuteman III in the field six years ago. And they have commissioned over 60 new ballistic submarines since we commissioned our last Poseidon some 13 years

ago. They produce a new fighter aircraft every several hours, compared to one every several days in the United States. In the last four years, Soviet plants turned out 13,500 tanks, more than our entire inventory.

This amazing output does not appear to be a temporary surge, either. The Soviets have greatly expanded their industrial capacity in recent years, and it appears that their past output can be sustained. There are 135

major final assembly plants involved in producing weapons in the Soviet Union. This tremendous plant capacity is supported by over 3500 individual facilities and related installations. Believe me, those plants are used most efficiently. As one weapon production cycle ends at a plant the next begins, with no layoffs or down times. This process, combined with ever-expanding new capacity, gives the U.S.S.R. a sound industrial base capable of responding quickly to changing needs or crisis contingency.

The staggering list of Soviet production could go on and on, but I'm sure the picture is clear. We face an adversary possessing overwhelming numerical superiority and growing steadily. But that's not all. The Soviet Union has made great strides in improving the quality of their weapons as well. They have often stated their goal of superiority in science and technology. And their growing military capability reflects the achievements of a steadily growing technology base. No longer is the sophisticated MIRV (Multiple Independent Reentry Vehicle) the sole province of the United States. Soviet radars, guidance systems, fire control systems, and aircraft technology now rival those of the West. Of even greater potential impact is the fact that they are the acknowledged leaders in development of directed energy weapons, such as high-powered lasers and particle beams — weapons with the

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potential to alter dramatically the strategic balance of the future.

On a more down-to-earth scale, the Soviets apply their technology rapidly and productively. They typically field one-and-one-half to two generations of new equipment to each one of the United States.

They often put new technology into their frequent modifications of fielded weapons. The result is a substantially lower average technology age of deployed systems versus those of the United States. The Soviets are also building an impressive technical force to implement and oversee their technology. Full-time Soviet scientists and engineers engaged in R&D work were estimated to number nearly 900,000 in 1980;

the U.S. had about 600,000. The Soviets graduated 300,000 engineers in 1980; we graduated only 58,000. We expect the Soviet engineer output to increase dramatically by 1990. Our output is predicted to peak at 65,000 in 1985 and then commence a steep decline because of the demographics.

This brings me to an area the strategic balance has often overlooked — the impending loss of our lead in technology. Due to our several years of neglecting research spending, while the Soviets have aggressively expanded their efforts, the days when we could rely on technology to offset numerical deficiencies are ending. Soviet technological superiority increases the risk of sudden breakthroughs and surprises, while our eroding technology base and insufficient technical manpower greatly weaken our flexibility to harness opportunities in response. This technological imbalance is a reality that must be considered in developing future strategic policy. It must be corrected just like the imbalances in numbers of missiles and aircraft.

What does this massive buildup of the Soviets, and the resulting shift in the strategic balance, portend for the United States and world peace? One could take the view that, feeling genuinely threatened by U.S. force, the Soviets sought to rearm for national survival. I do not subscribe to

this view, however, because I see a far more threatening purpose. I think they have set out on a march toward overwhelming strategic superiority.

Again, I recall Brezhnev's words of 1973, "To exert our will wherever we need to." I look back over the disturbing developments in Angola, Po-

land, and other troubled areas of the world, and I conclude that the Soviets now feel unencumbered by the fear of having their bluff called, and feel free to pursue aggressive policy wherever it serves their needs, regardless of international opinion.

Perhaps there is no better demonstration of this than the case of Afghanistan. Here the Soviet Union rolled into a sovereign nation with impunity, against the

combined expression of outrage from most of the world. The potential for future such Soviet excursions is high, given the unrest and instability that exist in crucial parts of the world, like the Persian Gulf and the Mediterranean states. I am gravely concerned that, unless the United States vigorously pursues defense improvements across the board to correct the deficiencies in our forces, we will be faced with one Afghanistan after another, and be incapable of affecting world events. We have little time to act.

Our first and greatest emphasis must be applied to the strategic forces, as the President has recently done. Now, I am not implying that strategic nuclear forces are the only answer to avoiding or controlling Soviet aggression — far from it. I can hardly imagine a more unstable situation than relying solely on nuclear brinksmanship. It would be horribly dangerous, and would certainly not be perceived as credible policy. Rather, we must possess the forces in quantity, quality, and breadth to affect events across the spectrum of possible conflict. However, it is an unfortunate reality of modern life that strategic nuclear forces remain the ultimate deterrent, and inadequate U.S. forces in this area would undermine the credibility of our military forces as an instrument of national policy.

So permit me to concentrate on the most glaring U.S. strategic deficiencies, and the administra-

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tion's proposals for correcting them. First, let's examine our strategic bomber force. The Soviets are continuously improving their capability to detect, track, and attack the low altitude bomber. In the near future these improvements will severely threaten our current strategic bomber forces' ability to reach and strike assigned targets. Today our force is composed primarily of B-52s, a product of 1950s technology. Although the B-52 is an extremely flexible weapon system, we have had to make what seem like endless updates to keep it current. We must acknowledge that there are limits beyond which continued modification becomes either impractical or excessively expensive. We've reached that point, and a replacement is urgently needed.

We must depend heavily on the bombers in the coming years while we take steps to strengthen our land-based and sea-based missiles. The B-52 cannot fill the bill, and we do not have the time to wait for the advanced technology bomber. But the B-1 can fill the bill; it will be able to penetrate the Soviet defenses well into the 1990s, and will provide time to develop Stealth technology and prove that it really works. Furthermore, the B-1 will make a good cruise missile carrier and conventional bomber, even after it can no longer penetrate. Stealth is deployed, and all B-52s are retired. Therefore, both bomber programs are critically needed and deserve your support.

Next let's examine the situation of our land-based ICBMs. Here we are faced with an immediate threat of disturbing dimensions and consequences. The term "window of vulnerability" has very real meaning. Based on Soviet writings, the Soviets' operational plans for their strategic rocket forces (the largest missile force in the world) point to a preference for seizing the initiative through preemptive attack on our nuclear forces and command and control wings. Obviously, U.S. ICBMs would be high priority targets in such an attack, and the Soviet threat during this decade would become so severe that we could have little confidence in our missiles surviving a preemptive

attack in sufficient numbers to present an effective deterrent. Thus we are faced with a de facto loss of one leg of the strategic triad of bombers, ICBMs, and sea-launched ballistic missiles. We would be forced into the position, reflexively, of whether to use or lose our ICBMs. This would put a destabilizing

hair trigger on nuclear war — a situation any reasonable person wants to avoid.

Worries about the survivability of the land-based ICBMs resulted in the President's decision to deploy the MX in superhardened silos. Such a deployment is intended to enhance survivability in the near term (recognizing that a long term decision must be found by 1984). This must be given highest priority in the future, and I will dis-

cuss it further in a moment.

Another element in the President's strategic plan is a marked increase in continental air defense. We have not heard much about this subject since the late 1950s. And the state of our air defenses certainly reflects a lack of interest. As to bomber warning, we are dependent on the Distant Early Warning (DEW) Line, deployed in the 1950s across the top of the continent. When deployed, it was a very good early warning system against World War II type aircraft. But the threat has changed. As to interceptor capability, we depend upon a few aircraft, very few, designed in the 1950s; we have not built or deployed a dedicated interceptor since 1960. The President has acted to correct these deficiencies by proposing acquisition of F-15 aircraft to fill the interceptor void, and the addition of at least six AWACS and new ground-based radars for CONUS bomber warning and interceptor control.

The last element of the President's decision which I will discuss — improving command, control, and communications — provides new emphasis for this often neglected subject, and for that I was particularly gratified. New bombers and missiles cannot be effective unless we provide the decision-maker the means of employing these weapons under all conditions. Therefore an enduring C<sup>3</sup> system is essential to give the decision-maker adequate time and information to select an

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appropriate response. It also provides a strong deterrent, by letting our enemies know that we still have the ability to exercise our force during and after a major attack. Right now we do not have an adequate capability; our systems are soft and poorly integrated. The President's program will correct these deficiencies by providing new systems and enhancing and hardening existing ones. This will not be a simple task of just throwing money at the problem and amassing a variety of equipment. That's been tried before, and has ended in confusing frustration. We must apply reasoned and deliberate management to the President's program, integrating a well-structured C<sup>3</sup> architecture with the offensive and defensive forces it supports.

I could go on for some time with this subject, but I fear that I'm eating into your time for panel discussions. Therefore let me conclude by offering two challenges for your consideration. They represent areas of greatest concern to me, and we all would benefit from your most creative and expert thought.

The first challenge deals with immediate problems. As you consider policy issues, it will be very tempting to use as a springboard the baseline reflected in the President's decision. This is, of course, appropriate. However, I would urge you not to overlook the significant period immediately ahead — before the next-generation systems can be brought on-line. We cannot assume that we have suddenly slammed shut the "window of vulnerability" simply by virtue of having made significant strategic decisions. The window will not close until the improvements the President has directed are put into effect. We will see some effects as early as 1985 or 1986; others will take until the 1990s to appear. In the meantime our policies must be responsive to challenges to our nation from whatever quarter. Simply stated, for the immediate future we have no recourse but to ensure our national security with the strategic policy instruments we have on hand, items which reflect national decisions of years far past. Therefore your best

thoughts about how to deal with the near term, new policies, new ways to employ existing resources, ways to milk the last ounce of capability out of existing systems, will be most helpful, and will be a productive outcome of this symposium.

The second challenge concerns the MX program. As the President has stated, silo basing is a temporary measure filling a gap until a permanent solution can be found. By 1984 we must find and implement a lasting solution. This certainly will not be easy. The last 15 years have seen exhaustive study of the question, and as yet no solution has surfaced that meets all the criteria of military effectiveness, cost considerations, and environmental requirements to the satisfaction of all concerned. I urge you to give careful thought to this subject during your session on weapons systems perspectives. I will not ask you to create a new basic concept, but your thinking on the role of MX in the context of future policy would be most helpful. Consider the policy implication for force employment options of some of the key alternatives the President mentioned: deep underground basing, long duration air patrols, and ballistic missile defense. See how they fit, and see how the program should be molded to fit your perspective on future strategic nuclear policy. Or, from the other viewpoint, how future policies might have to be molded to fit the MX variance.

Well, ladies and gentlemen, I'll conclude on this note of challenge. I trust that the brief review of strategic balance and the issues surrounding it will be useful during your discussions. I know that each and every time I review where we stand in light of our adversaries' growing might and the events of recent years, I have a feeling of renewed urgency for buttressing our defenses. I hope you share this feeling and my enthusiasm for getting on with the job at hand. Thanks for letting me speak to you, and I hope you have a really productive symposium. Thank you.

## Guest Speaker

### Gen. Russell E. Dougherty

**USAF-Retired**

**Executive Director, Air Force Association**

I spent last week in SHAPE, and the week before at the Atlantic Treaty Association in Europe, and I would like to report that things are somewhat in a state of disarray there. The consequences, I think, begin to come home to you when you see 250,000 protesters assembled in a university town of only 25,000 population. You read that church groups in Europe chartered 34 trains and 4,000 buses to bring those people from Belgium, the Netherlands, Denmark and Germany.

Then I picked up a vignette on the demonstration against Al Haig in Bonn that maybe we didn't see over here. A very strident, irate young woman among the demonstrators was interviewed by a TV announcer. The announcer said, "Why are you doing this?" She said, "I hate Secretary Haig. I hate him so much that if I had him in the sights of a rifle I would feel no qualms at all about pulling the trigger." And the announcer asked, "How do you feel about Minister Ustinov?" She said, "I don't know him."

This is an unexplained situation. We have allies in France — people who share our heritage, who share our security interests, who share our freedoms — violently demonstrating against 500 or so weapons that are two, three, or four years from being in Europe. But there are no demonstrations at all against the 750 or so Soviet weapons already deployed in and around western Europe that can reasonably be expected to be targeted on Europe. This is an anomaly of our times. How could they demonstrate against something we're talking about doing, with no demonstration, no interest, in what has been done?

Where is the constituency for restoring relevant strength? Much of it is in this room. And I think, not to be political but to recognize a fact, that there's a major hope in the White House, in the Security Council, in the State Department and in ACDA. The President's decisions are such that I think he's batting .900. That's twice as good as Ty Cobb did in his best season, and that's pretty good.

I think his decision to improve air defense is right on. I hope the people in this room share that view because we were in a position where we were offering a very effective cheap shot to anybody who wanted to take us on. We were offering almost a free ride.

We're plugging that hole, and we're starting down a path that may offer a great opportunity to reverse the view that, since we cannot protect against missiles, why bother to protect against aircraft?

I think the decisions that the President has announced on C<sup>3</sup> will be welcome in this environment, in ESD and in MITRE. Thank God we have ESD and MITRE to handle the task if even a small portion of the President's decision gets Congressional support and long-term application. And if it doesn't get long-term application, God help us, because we'll be back to band-aids and modernization through spare parts. There's going to be a tremendous resource investment however we look at it, and we're going to hazard indigestion if we aren't careful, as a nation and as a command. The concern will be that we can't invest it wisely, that we can't invest it thoroughly, that we will be inefficient in our decisions, and wind up with a situation described like this: you've got the Navy, the Marines, and the Air Force and they can't talk to each other without buffers. How do you expect to get our allied nations talking to each other? How do you expect to get a true global capability when you have different baud rates and you have to have a different set of equipment for your interface?

These are problems that I don't think we should drag out and overemphasize as I have seen done. If the President is batting .900 on that decision, and if you're disposed to agree with that, you know that the decision as a whole is the thing that we should look at first. The facets of it with which we may individually disagree or have great concern about — and I have concerns in regard to the MX basing option — don't diminish the effectiveness and the bravery of the major decision.

If efficient missiles are proposed for our submarines, you'll hear the canard "first strike." Remember that's a decision as to use; it doesn't affect the efficiency of the weapon system. For years we have been saddled with inefficient weapon systems for application to bona fide targets. We have been working with a collection of various types of inefficiencies. We've tried to overcome them as best we could through planning. Why must we build less efficient weapons than we can build with extant

technology, just because of some political canard that they might be used as a first-strike weapon?

I feel good about the B-1. Some people say, "You're going to build an antiquated airplane." I think the people in this room know it's not going to be an antiquated airplane. And one thing that impressed me about the B-1 decision is that we are going to get badly needed, modern, long-range operational equipment quickly; plus, we are continuing our serious development of advanced, low reflectivity aircraft for the future.

I am not at all opposed to pursuing the advanced technologies that in a conglomerate sense we call Stealth. I think we're doing exactly the right thing, but I think there's a fragility about it, based mainly on lack of thorough understanding. A fragility because we haven't really wargamed it yet. We haven't put a real devoted red team on it to see what a red team can do. By watching the Soviets we might find out what a red team can do. But we know what we can do with equipment like the B-1. The command can digest the B-1B capability, plan for it, use it immediately with confidence. This unmeasurable but vitally important capability of an operational force to assimilate a new weapons system into its inventory and to make it operational quickly is a real plus.

And we can do that with the B-1B. We know its vulnerabilities, because they're real — they're not esoteric. Some, in the areas of electronics, countermeasures and counter-countermeasures, we'll have to learn about, of course, but by and large we know how to employ that weapon system, and the charge of vulnerability is not one that we should let lie. We know how to handle vulnerabilities because all of our military forces have them. We know how to plan around vulnerabilities.

The other charge against the B-1B is, "It won't penetrate." Can anybody here define "penetrate?" There are probably as many images of penetration as there are images of war in this room. There are some penetrating tasks that the B-1 cannot be expected to do, and we won't do those. On the other hand, there are things that it can be expected to do very well, and we can exploit those things.

An airplane such as the B-1, with electronic modernization, with aluminum that's new, with instruments that are new, with a radar that's state-of-the-art, and with a family of weapons systems that goes beyond just conventional nuclear ordnance, is vitally important for us. It gives needed flexibility. But I don't think we've really developed a thorough appreciation of just what a

long range combat aircraft such as the B-1B, with a good armament suit, can do for us across the spectrum of conflict. We've never had that armament suit before. We've never yet had a really first-rate family of conventional weapons.

Cruise missiles: I've been studying the European theater nuclear problem for some time, and cruise missiles remote from Europe would very capably serve to balance enemy targets against our ability to put them at risk. But they lack perception. There's an old saying in Europe that's worth keeping in mind: "The perceptions are the realities." All of us who have served in Europe as much as six months come away recognizing the truth of that statement. This country is not immune to that allegation. In our country the perceptions are the realities, too. And one of the negative things about an external cruise missile system is its lack of perceptivity in the actual territory of NATO Europe.

This, to me, drives the logic of the decision on theater nuclear force. The weapons we'll put there with the Pershing II, and the weapons we'll put there in ground-launched cruise missiles, are integral to the territory they are to defend. Not because that's enough weaponry to attack the whole range of targets that are now there, or to attack those that will be there, but because such weapons systems put those targets "at risk," something we cannot now do. If I were asked, based on four tours of planning responsibility in Europe, "Is there a single thing we can do to keep stability in this area of direct confrontation that has the potential for being so volatile?" It's not that simple a problem, but if there were a single answer I would say, "Put at risk the second and third echelon reinforcements that the Soviets would move to shore up their in-place forces." In my judgment, if we could do that and do it well, and do it so that the Soviets would perceive that their reinforcement echelons were really at risk, then we would have a good chance of keeping that situation stable indefinitely.

MX: I'm concerned about the failure of the President to select a basing option. I'm concerned about

those being talked about, because I don't think they warrant the weapon that we're going to put in. But I think the weapon is badly needed, and I'm glad we're pressing on with it. At the moment, I think we go from here on faith until the Administration makes up its mind. Some of you served on the

Townes committee. You didn't come up with a very cohesive report either. You came up with one principle that was negative, but what about the positive principles? So we're just going to have to go through all of this again. A lot of people in this room share with me the 20 years plus that we've been agonizing over these basic options. No doubt, this is a tremendous decision; but, I trust the President's motives and I want to help.

I want to say one other thing, and then I'll quit. I want to tell the story of Doctor, Professor, Colonel, General Abe Lincoln, Political Science Department, West Point. Many of you in this room know him as former head of the QEP, a cabinet officer, one of the great intellectuals of our time, a practical intellectual. He came into our seminar in the National War College and wrote something on our blackboard that is indelibly burned in my memory: "Capability times will equals deterrence." Simplistic, useful to any level of sophistication. Capability times will equals deterrence. Then he backed off and said, "Notice I've written a problem in multiplication, not a problem in addition. You must think of deterrence as a product — not a sum. If either factor is zero, the product is zero."

It's the will of this country that I think deserves our greatest attention. Not just the will of the United States, but the will of our allies, too.

This is why we must constantly make the case that deterrence in the modern world is everybody's business. Deterrence is more than our military, more than the capability we engineer, design, produce and make operational. It's also the will of our people, and that can't be offset by any quantity of capability, because there are two basic factors in the equation, and if either of them is lacking, the other is diminished. The will is expressed in the way people in the military, and people working

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with the military, are treated. This is why the military pay raise had far more importance to me than just 14.3 percent, or increased allowance for hazardous duty, or this, that or the other. It represented an expression of the will of the nation to do something in the long term about the people who are committed to its security process.

Here is one of the things that is so critical to the will of our people. It's a historical perspective, but I think it's accurate. Our nation, for the first time, is faced with the necessity of maintaining, perhaps indefinitely, a quality force — a well equipped, competent force in being — without major reliance on a muster of the civilian militia. This critical reliance on forces in being has only happened in our lifetimes. Look back at our nation's history, and look back at the history of other nations. In our country, we have always fought our battles with the civilian militia. We've oftentimes kept the arms stacked, or we've had cadres that were experienced; but, in crises, we've called up the militia, issued them equipment, mobilized, fought with our militia — and then demobilized them almost completely.

But we've got to recognize that we can no longer rely on calling up the militia, of which I was a part and many of you may have been a part. It's a new ballgame, made new and different by modern

technology. Technology has brought us to the point where we've got to maintain a force that is relative to the threats we face; a force that is in being, well equipped, capable; a respected military force, but one that is a part of the fabric of our society, not a perturbation in our civilian pursuits that just needs us now and then.

Yes, modern deterrence is everybody's business, not just yours who supply, think, design and engineer, build, procure, man, and equip. It's everybody's business.

The resolve of this nation — our will — gets expressed in so many ways. Such as: "Where are we going to put our missile systems?" The decision is a major indication of resolve, or the lack of resolve. What will the Europeans say when we demonstrate that we haven't got the guts to put our missiles where we live and instead want to put them far away somewhere, as if we were spectators in our own defense rather than participants? They can be very efficient military weapons, but they must be coupled to our will as a nation. Remember, the perceptions are the realities, and never was that more true than in the nuclear issues we face. I hope our nation has the "guts" to hang in there for the long haul. If we don't, we can't expect to deter the threats of today — or tomorrow. Deterrence is everybody's business.

## Guest Speaker

### Dr. Edward Teller

**Senior Research Fellow  
Hoover Institute of War, Revolution and Peace  
Stanford University**

A few months ago, I found myself on the top of a rock in a place called Erice. This is supposedly the place where Odysseus met the Cyclops. I was there for a discussion, at the request of the Pope I understand, about the consequences of a nuclear war. As usual, there were some hawks and some doves. It was remarkably easy to tell them apart. All the hawks argued that we should defend the American people and save as many lives as possible. On the other hand, the doves suggested we should throw as many missiles on the Russians as possible.

This insanity is the direct consequence of a postulate which is as unshakable as most of Euclid's postulates (one of which has been shaken incidentally). It is a consequence of the postulate of mutually assured destruction (MAD). I have heard some subdued doubts expressed about MAD in the last few days, and I want to voice an unsubdued doubt.

In 1945 we had a nuclear explosion which was a thousand times bigger than any explosion before. A few years later, a fusion explosion bigger again by almost another factor of one thousand led some people to the obvious extrapolation of a doomsday bomb. Peculiarly enough, bombs did not continue to grow in destructive power. Weapons became more sophisticated in many ways — ways about which all of you should know. However, many of you are not allowed to learn about this because you do not have security clearance. We are continuing to keep secrets from you, secrets with which the Russians are completely familiar.

There is, however, a new tendency in weapons work. One can clearly notice it in the set of activities at Lawrence Livermore National Laboratory. The early atomic bombs were considered good for one thing, destruction. This was not just an opinion, this was a fact. We are now working on nuclear

weapons for defense. I claim that this development will succeed. I have a suspicion that, as is true in many cases, the Soviet Union may be ahead of us in this military application as well. Therefore, quite apart from the fact that the MAD doctrine is simply mad, it is also unstable. The moment that someone has a good defense, MAD no longer works.

In an unclassified and therefore incomplete way, I can offer two familiar examples of nuclear weapons for defense. While familiar in name, in their present more elaborate form they are much improved and can be made even more effective. One example is the neutron bomb. As anyone knowledgeable will tell you, this is not a neutron bomb, but it has something to do with bombs and neutrons so the name will serve.

The extensiveness of Soviet propaganda about this weapon suggests that they are really scared of its defensive effectiveness. "This is a real capitalist bomb which will save property and destroy only people." It is probably unnecessary for me to explain how this argument should be properly formulated. It does seem peculiar to disparage a weapon that spares both defended villagers and their simple possessions and in a practical sense kills only the invading military personnel.

A neutron bomb is a small explosive the main effect of which is prompt radiation. It is exploded at an appropriate distance above the surface so that heat, shock and fallout effects can be completely neglected. At worst, a few windows will be broken. However, people directly under the bomb will be killed, and those a little farther away will be incapacitated and will die from the effects. At a mile distant, people are completely safe. So, as the invaders approach, the people in the invaded area must flee to assure their safety. However, failing that, if they go into a reasonably deep cellar — not even a very elaborate one — they can remain in complete safety even directly under the bomb. The whole attack lasts only a second, and it is effective against troops, tanks and airplanes.

I would like to make a rather general, far-reaching suggestion — far-reaching to the extent

that I am sure it will not be accepted except in the course of time. Nonetheless, it is worth serious thought. I am an opponent of an American first strike in any shape or form. I believe that the majority of the American people will never approve of it. It is a remarkable historical fact, although it has

been somewhat exaggerated, that the people of the United States have only been really united to fight during one war — the Second World War. If one looks carefully and dismisses the arguments presented about past successful wars, one finds in each case a lot of deep disunity. World War II had a minimum of that because Roosevelt was wise enough to wait until the country was really united.

I remember that when I immigrated in 1935, I was very impatient, and I became upset and unhappy during the next few years. Why didn't the United States do something? In retrospect, I think I understand that only by waiting could we have been really effective. I am, for that reason, absolutely opposed to any talk about or consideration of a first strike.

We should clearly, in words and in action, renounce the possibility that we would ever use nuclear weapons first on enemy territory. However, we should be completely free to use nuclear weapons wherever and whenever we wish on our own territory for defense. If there is an invasion of Western Europe, we will want to use the most effective defensive weapons — those that will not inflict undesired damage on our own side and that will stop the enemy's invasion. If our allies approve (and one must assume that they will once they understand the elementary facts), neutron bombs can stop the 40,000 Soviet tanks. It won't be easy, but it could be done. Further retaliation, should it be decided upon, should be against Russia and not the Eastern European hostage nations who are our potential allies. This is half my story.

The other half is similarly familiar. It is the question of defense against incoming ballistic missiles. Although we have no treaty prohibiting research on ballistic missile defense (BMD), we do have a treaty which limits the deployment of such a system,

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and this understandably results in less emphasis on research. The President's announcement, most fortunately, reverses that trend. We now have a chance at least to go ahead with research.

Perhaps, by telling a story, I can best explain why I so strongly favor BMD and in fact favored it long

ago when it was called ABM. The most agreeable experience I had in the 1969 ABM debate occurred when I was invited to Idaho by the media. They held a convention at the hotel in Glacier National Park just before it was opened to the public. We had the hotel to ourselves, and the weather was beautiful. I went out for a walk, and a few people came along with me. That afternoon, I was introduced in the following

way: "This morning Dr. Teller went out for a walk in the sunshine. A few hundred feet from the hotel, he picked up a big stick, and I asked Dr. Teller what the stick was for. He said, 'It's to use against grizzly bears.' I asked him, 'Don't you know that a big stick is of no use against grizzly bears?' The doctor replied, 'Yes, I know, but I hope the grizzly bears don't know!' Dr. Teller will now talk about the ABM."

I don't want to identify myself completely with the man who introduced me. First of all, there was a flaw in his anecdote. I have a little difficulty in walking, but I didn't want to explain the stick on that basis, so I lied. Nonetheless, the story illustrates a point that is often overlooked. When we begin to introduce ballistic missile defense, we are not going to know if it will be effective. Therefore, the Soviets won't know whether or not it is effective either. The Soviets are not gamblers. Therefore, even an imperfect ballistic missile defense is a good deterrent.

Several types of ballistic missile defense are being discussed currently. For example, some people say that we can have such accuracy now that we don't need to use nuclear explosives. Nonsense! We cannot afford to give away any potential advantage in constructing a ballistic missile defense. One can use lightweight nuclear explosives — small ones like the neutron bomb of fifty or one-hundred tons

explosive power — mounted on cheap and agile missiles. The small explosives won't interfere with radar, and at the altitude at which they would explode over our country, they would do no damage whatsoever except to the incoming missiles.

Most importantly, they greatly increase the chance of stopping the attack.

**Zraket.** Edward, you didn't cover this subject in your talk, but will you comment on the President's message on strategic programs and, in particular, on the bombers — the B-1 and the advanced technology bomber?

**Teller.** The President's message was a very long step in the right direction. He did mention, for instance, ballistic missile defense. He did mention civil defense. Now as to

bombers, I think the B-1 is absolutely necessary.

I believe that the advanced technology bomber (Stealth) should be subject to very careful scrutiny because there is a possibility of countermeasures. One should try to evaluate how easy and how obvious these countermeasures are. Honestly, I don't know the answer. I can argue for and against the advanced technology bomber. I hope that in a few months I will know which argument is stronger and whether it's much stronger.

However, the President did not mention one thing that I wish he had. We have cruise missiles. These are stupid beasts, totally preprogrammed to do one certain thing. I would like to see small planes and missiles, unmanned, with which we can have reliable communication links. For instance, the B-1 could be the mother ship containing the crew which receives observations from these unmanned vehicles and then gives orders to them. Our advantage in electronics puts us in a position where we can do better than the Soviets in this particular area. One might eventually develop this idea to the point where the people directing these internetted unmanned vehicles could do it from CONUS.

Small unmanned vehicles could be extremely useful. They could do almost anything — reconnaissance, defense, attack. They would be expendable, and they would be numerous. The cruise

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missile is a healthy, although not very long, first step. I hope that more will happen in this area.

**Nye.** If we had several billion dollars to spend on civil defense, what would be your priority?

**Teller.** We are not going to have the absolutely essential money at once. However, I am confident because of the President's message and because of other signs of interest from people close to the President that civil defense will no longer be completely neglected. At the same time, the amount of money will be limited. I believe that civil defense is most important and is the best possible deterrent. The Russians do not want to hurt us. The Russians only want to wipe us out. If the United States survives an all-out conflict in any shape or form, the survivors will not be in the soft and peaceful frame of mind that the majority of our citizens now possess. The Soviets know that Americans could become very dangerous. Therefore, they are unlikely to attack unless they are sure that the United States would cease to exist as an independent organized unit.

To ensure our survival, what is the first step? I am almost completely convinced that the Soviets will not attack us without first evacuating their cities. This would enable them to keep their casualties below the level they experienced in the Second World War. They have made the necessary preparations for an evacuation, and I doubt that they would fail to use their plan. A Soviet mass evacuation would be noticed. If it occurs, we must engage in counterevacuation on a voluntary basis. I don't share the view that having observed Soviet evacuation we should fire our missiles. Instead the President should explain that Soviet evacuation had been observed and that staying in the cities was a great risk. He should then give the phone number at which everyone could obtain information about what to do, when to leave, where to go, how to help one's neighbors, and other information.

How much money would be needed to have this amount of preparation? I don't really know, but I think to get this exodus organized, to have fallout shelters (and perhaps mild shock shelters as well) established in the evacuation areas, with food and medicine for a few weeks, would cost about two billion dollars.

I do not think that this amount of effort is sufficient. We will need hard shelters for essential workers who have to remain behind and for other services which would have to be provided in an evacuation. This will take more money. In the end, I believe that total expenditures over five years will

amount to five billion dollars. Compared to our defense expenditures, this one billion dollars per year would be the best spent of all our money. Not only would civil defense save lives in case of an attack, but it would protect us against blackmail. Without civil defense, if the Soviets evacuate, we either have to fire our missiles (which I don't want to do and which in the end would not be a feasible action), or we have to acquiesce to any demand that might be made.

**Question.** Am I to understand that you believe that the United States will limit its options to using nuclear weapons only in response to a nuclear attack?

**Teller.** I think that this is entirely possible. I am by no means certain. I wouldn't even care to put a percentage probability on it. However, if we develop ballistic missile defense, we can frustrate a nuclear attack. In establishing ballistic missile defense, I agree with those who think the first elements we should defend are our silos. These are a very sharply defined pinpoint and are thus more easily defended. The system, once established, can later be expanded to defend the whole country. We have to start somewhere, and defending our capability to strike back — our deterrent force — is a reasonable beginning. This step will not allow us to abandon MAD but will be a considerable step toward shifting MAD toward MAS: mutual assured survival.

**Kahn.** I just want to make a comment on the Roosevelt thing which may be of interest. I was at many Army information meetings in World War II where soldiers got up and said, "How come we declared war on Germany?" and many in the audience would repeat it, "Yes, how come?" And the answer was very simple: we didn't. Many influential Americans went to Roosevelt and said, "You have got to declare war on Germany. Otherwise we will lose the situation." And the pressure from his staff was really fantastic. And I think we should have declared war. I would have if I had been in his position. For reasons that we still don't know today, four days later, Hitler declared war on us. We still don't know why. It was probably the biggest mistake he ever made. And the reason I mention that today is that I think the issue is a very important one. That we should make the kind of announcement that you're making, "Don't shoot first against the other country."

Let me make one other quick comment. I believe Edward (Teller) is absolutely right, that for five billion dollars over five years, this nation could

buy an extraordinarily useful evacuation ability. Indeed it is probably the cheapest effective weapon system we can buy and it is incredibly important. I don't know what the question is, but maybe you can answer it.

**Teller.** I will answer you, but I will not answer whether or not what you asked was a question. I will contradict you, which is not nice of me because you agreed with me. Obviously I am a very aggressive character. I want to contradict the statement that Hitler's biggest mistake was to declare war on us. It was a very big mistake, but Hitler made so many big mistakes that I really don't know which was the biggest. I believe it was extremely wise of Roosevelt not to declare war on Germany but to wait and give Hitler this chance to make a mistake. Hitler detested and underestimated the United States. Hitler was the kind of gambler who is superb when he's winning and incredibly stupid when he's losing. It was practically foreseeable that he would always take an aggressive stance. Up to a certain point, it paid off. After that, it was a

terrible mistake on his part. This is absolutely clear with the wisdom of hindsight.

Had we fought the Second World War with as incomplete a dedication as we brought to the First World War, then Hitler would not have been making a mistake. Looking back on history with 20/20 hindsight is a terrible impediment to understanding. One should always ask how it could have gone differently. What would have happened if the Nazis had used the jet aircraft they possessed at the beginning of the Second World War? What would have been the result if Hitler had given timely permission to retreat? I can go on and on with the incredible mistakes Hitler made. We tend to forget that as things turned out, Hitler still almost won, even though the United States was working against him with truly unprecedented unity and dedication.

My main point in these comments is to inject a bit of uncertainty where I think uncertainty does belong. Thank you very much, Herman, for your provocative non-question.

# **Session I**

## **Factors in Development of Strategic Nuclear Policy**

### **Introduction: Professor Paul M. Doty**

**Director, Center for Science and  
International Affairs, Harvard University**

**P**rofessor Pipes will go first, followed by General Brown. That will give you the theory and the facts. Then General Rowny will speak of the arms control options and the planning, and Marshall Shulman will provide the critique. Each speaker will deliver his ideas within about 15 minutes and will then answer questions for 5 minutes. That will leave 40 minutes at the end of the session for a general discussion among the panel members and more questions from the audience.

It seems to me that we all owe the organizers and managers of this conference a vote of appreciation for the excellence of their timing, because it is only this week that so many things have come into place. The budget is set, the strategic package is set, and the dates of the beginning of TNF and SALT negotiations are set. The Soviets have not gone into Poland, the Middle East scene turned around several times just last week and, in fact, everything seems to be settled except AWACS for Saudi Arabia. So, against that temporary halt in fluctuating background, we can pause and look at the scene.

## Dr. Richard Pipes

Senior Staff Member,  
National Security Council

**T**he subject of our conference is factors in the development of strategic nuclear policy. That, at this particular point, really means the development of a strategic nuclear policy vis-a-vis the Soviet Union, in the sense that the strategic nuclear policy in the present generation involves essentially the two superpowers. In the years and decades to come we may well have to concern ourselves increasingly with the problem of nuclear proliferation. It may be that in the twenty-first century the real problem will derive from proliferation, simply because the strategic balance between the two superpowers is more easily controlled than that among many smaller powers. Nevertheless, the problem which faces us now is that of the strategic race between our two countries. When considering what the factors in the development of strategic nuclear policy should be, we must concern ourselves not

only, and not even primarily, with the technical capabilities of our systems (offensive and defensive), but with the technical capabilities, and above all, with the strategic theories and intentions of the other superpower.

Astonishingly little thought has been devoted to this subject until recently. Essentially, the deterrent which we built up in the 1960s was devised, as far as I can tell, against a theoretical model of what a deterrent ought to be, with virtually no attention being paid either to Communist ideology or to Soviet military strategy, or to the whole mode of thinking known under the label of Marxism-Leninism.

When I wrote my article in *Commentary* in 1977 which dealt with this problem I originally intended to call it "It Takes Two to Tango," but my editor thought it did not sound serious enough and he changed it. It eventually appeared as "Why the



**Soviet Union Thinks It Could Fight and Win a Nuclear War."**

When I first became involved in these matters, I was astonished at how little attention was paid to Soviet theory and intentions. I could never understand, and to this day cannot understand, how serious people could construct what they thought would be a credible deterrent, which after all is intended to deter a specific group of people, without taking into account the values of those people, their particular traditions, their fears, and their ambitions. Why we ignored that aspect of it is a story in itself, and I don't intend to go into it here, except perhaps to point out two contradictions. One is that, to a large

extent, our strategic posture has been devised by scientists and engineers, who tend to be influenced by positivism — broadly speaking, a theory which tends to ignore history, historical traditions, cultures, and things of that kind as largely irrelevant. Secondly, many of the natural scientists, engineers and political scientists tend to be rather of a liberal persuasion. I have noticed, in my experience, that the attitude of liberals toward Russians and toward the Soviet Union tends to err on the side of generosity, largely out of condescension and contempt for the Russians. I think the further you go toward the right on the spectrum of political opinion, the more respect people have for Russian prowess and the less condescendingly do they treat them. But whatever the reason, we devised a deterrent strategy that I think was faulty, and is now being corrected, because it did not sufficiently take into account Soviet culture and Soviet military theory.

We developed, therefore, a deterrent that fundamentally would have deterred us if we were Russians, but would not necessarily deter the Russians. In particular, we have paid major attention to the destruction of cities and industries, what we call "values" of human beings and means of production, believing that this threat would deter them, because indeed it would deter us, whereas it is by no means quite the deterrent to

the Soviet side that it would be to ours. Conversely, we always underestimated the immense importance which the Soviet leaders attach to political command and control and political survival as the highest good, which they are not willing to sacrifice.

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Now let me very briefly go over the factors that make up the Soviet strategic posture. We must take these factors into account in preparing our own strategic posture, and in fact, we have done so in the recent program of strategic reinforcement. One is, of course, the militancy of the underlying Soviet doctrine, which is a child of social Darwinism. It is essentially a mid-nineteenth century doctrine, based on the premise that all

life is conflict, that someday in the distant future, when all class structure disappears, there will be no conflict, but that on this earth as we know it, it is inevitable — this is the kind of world it is. One can cite many quotations to that effect. My favorite comes from Lenin, who said "As everybody knows, peace is merely a breathing space for war." Ordinarily he was very careful not to make such blunt pronouncements, but every now and then they did slip out. In another speech he said (I paraphrase), "Of course the triumph of socialism or communism over capitalism, while it is inevitable, may not ever be accomplished except through a series of the most horrible wars between the two systems." This is deeply imbedded in the ideology that is conflict-oriented.

Secondly, because the system is so oriented toward triumph, it does not recognize the principle of parity, which ultimately stabilizes the world and accepts the status quo. The Soviet elite can never accept parity in anything that matters, that involves power, because to do so would be, in effect, to give up the ultimate objective of the system.

Thirdly, and perhaps in some ways more directly applicable to what I'm saying now, the Russians seem to have decided sometime in the late 1950s (after a very thorough study of the kind that I don't believe has been undertaken in this country) that nuclear weapons have become the centerpiece of

modern warfare, that they are the decisive weapons of modern warfare, that the revolution they have accomplished in warfare is as fundamental as that which gunpowder brought about when introduced in the early modern age. The distinguishing quality in their view of strategic weapons is not their destructiveness, as we would think, but their ability to achieve strategic objectives prior to tactical and operational objectives. Russian theoreticians say that, for the first time in the history of warfare, they have a weapon which can right away achieve a strategic objective — the destruction of the enemy's will and ability to resist. And the rest of the military operations, tactical and operational, are fundamentally mopping-up operations. This stands in complete contrast to the whole history of warfare, where victory was achieved through a series of tactical operations leading toward a strategic end. Having decided that, they have proceeded to develop an awesome strategic force.

Fourthly, Soviet thinking is to a very large extent dialectic thinking. This is a much abused term, but I'm using it in a rather specific sense, to mean that they do not see subjects as being defined by their own essence, but by their relationship to their opposite. This means, in effect, that they do not think in the either/or terms characteristic of our mode of thinking, but in modes of thinking in which seeming opposites are closely related. Specifically, for example, they do not see war and peace as being contraries, but rather as ultimately related phenomena, so that you have war going on when there is peace and peace going on when there is war.

In relation to strategic weapons, let me call your attention to some examples. They do not see deterrence and war fighting as opposites, they are parts of the same phenomenon. They do not see offensive and defensive weapons as antithetical. Finally, they do not see strategic weapons and theater weapons as being contraries, in the sense that we distinguish them. They're all part of the same spectrum of continuities. It is rather sobering to think that the Strategic Rocket Forces of the Soviet Union control all weapons with a range of 1000 kilometers or more. That embraces a wide spectrum which we regard as long-range theater weapons — they all come under the same command. The distinction which we draw between INF and strategic weapons does not exist in the Soviet command structure.

These are some of the examples of the ways in which they think. We have to understand and

incorporate them in our ways of thinking to build credible deterrence. Deterrence, of course, is the only sensible way of dealing with this problem, which we have created for ourselves by the invention of nuclear weapons. But the deterrent, to be effective, has to be credible. It will not do to speak of "unacceptable damage," a term I've never found a proper definition of. You have to develop unacceptable damage in the framework of Soviet thinking. And that is above all not human casualties, which the Russians can bear in very large numbers, nor destruction of property, which they have also shown they can assimilate, especially if the stake is the triumph of socialism or capitalism, but destruction of weapons, communications and control, and the political system as a whole. That is the vital nerve.

Our strategic package as now devised is more credible as a deterrent than what we had before, because it is adapted to that way of thinking. I think it therefore will be far more effective as a pawn or a collection of pawns for trading in arms negotiations. The people who run the Soviet Union are not madmen; they are not suicidally inclined. If we create a deterrent, as we are about to do in the next few years, which will respond to their conception of what deters and what vulnerabilities they have, I think we will be able to engage in meaningful arms negotiations of the kind we are now trying to launch under the name START (Strategic Arms Reduction Talks). But to be able to do that we have to create a deterrent which is conceived in terms of Soviet anxieties and the Soviet view of the world, and which therefore does threaten with a credible second strike capability. I think that's what we're about to do.

**Question.** How could you modify your statements on Lenin when applied to China?

**Pipes.** I am no expert on China. Let me say that when I visited China two years ago I was struck by the immense differences between Chinese and Soviet ways of thinking. The Soviet way of thinking is determined not only by ideology, of course, although I stressed ideology, but also by historic tradition and by culture. These are vastly different from those of China, which is far less aggressive generally. What struck me in China in contrast to Russia was the tremendous depth of Chinese culture. By that I mean culture not only with a capital "C" but with a lower case "c": village culture, an ancient culture which makes these people, I think, more content with themselves and their mode of life and therefore less aggressive.

I don't detect a particularly aggressive element in China, either in their behavior or in their theory. Communism, of course, is essentially an aggressive, expansionist theory, but in and of itself I don't think it is quite as menacing as when it's coupled with a national tradition that is expansionist.

**Question.** Did you say that political and economical deterrence can be applied instead of military deterrence?

**Pipes.** No, I didn't say that. What I meant to say, to oversimplify, is that it's a distinction between countervalue and counterforce. I realize that we never were purely countervalue, and we are not purely counterforce today, but the stress has shifted. We thought in the 50s and 60s that the destruction of — I forget

what figures MacNamara used, what proportion of Soviet industry and what proportion of population we had to be able to destroy to create a credible deterrent. I don't know where he got his figures, why he thought this would be a credible deterrent, why he thought destroying, I think he said, one-third of the Soviet population and two-thirds of Soviet industry would be a deterrent. Why not fifty percent of both?

Our present deterrent is geared toward attacking military objectives, command and control, and the nerve system of the Soviet leadership — that whole system which confronts us. In Soviet terms this is far more menacing, and therefore it is a great inducement, first of all not to strike, and secondly to come to the negotiating table, than the previous one had been.

**Question.** Could you say something about nuclear proliferation?

**Pipes.** The Soviet Union is strict about nonproliferation. It makes quite certain that none of its allies gets nuclear weapons. This was one of the big factors which led to a break between the Soviet Union and China. We have a much harder job, because our allies are technically more advanced, and we have no way of forbidding them to manufacture nuclear weapons and no effective way of preventing them from selling them, or at least selling the technology. From this point of view the

Soviet job is easier than ours. We are trying to do what we can, but as the readers of the newspapers know, it is a very difficult thing to do. The only effective move against nuclear proliferation was taken by Israel a few months ago (air attack on Iraqi reactor), and it did not earn the gratitude of the world for that move.

**Question.** In the recent past we've been advertising, in newspapers, through symposiums such as this, and in speeches on television, the extreme weaknesses of our strategic and conventional forces and our command, control and communications systems. Is not this an encouragement to the Soviets to act more boldly in the next five years? Or do you think they will sit by and wait

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until we build up our systems to a greater strength and parity?

**Pipes.** First of all let me respond that the Russians do not act on the kind of information that they get from newspapers. They have their own sources of information, and they deal with the information very realistically. We don't know what their SIOP is, but they make no secret of the fact that communications and control are very high on their target list. In the various books and articles written on the subject in the Soviet Union, some of them classified and subsequently declassified in this country, they make this very evident. I personally do not believe that the Soviet Union would launch a preemptive nuclear strike against the United States out of the blue, no matter what the balance of power is. I just don't think that is in the cards. The great danger is that, in a world crisis in which there is an escalation of hostility between our two countries and where both begin to alert the forces and so on — where indeed war between us becomes possible — at that particular point they might strike preemptively.

In other words, the Russians draw a distinction between what they call preventive war and preemptive strike. They do not believe in preventive war, while they do believe in preemptive strikes. Now, if in the next few years such a situation should arise, we would be in a position of risk. But

even there they would really have to be convinced that war is about to break out and that we might launch a preemptive strike against them, and that is a matter of obsession with them. In other words, to answer your question, I don't think the mere fact that there is imbalance between us and them, now and in the coming few years, would tempt them to strike. It might tempt them, however, during this interval, to use their military might increasingly to engage in political blackmail — to force us to do things, or to throw their weight around in various

parts of the world and force us to back down the way we forced them in Cuba in 1961. That is, I think, a very high risk. Some people believe that in 1973, during the October War, they already did that, when they more or less forced us to apply pressure on Israel to hold back its forces and not engage in a full-scale attack on the Egyptian Third Army, which was trapped. That sort of behavior is very likely to occur in the next few years when the "window of vulnerability" is open.

## **Maj. Gen. James L. Brown, USAF**

**Assistant Director for Joint Chiefs of Staff  
Defense Intelligence Agency**

**I**would like to explain very briefly my job. I supervise the part of the Defense Intelligence Agency concerned with current intelligence, intelligence support to the Chairman of the Joint Chiefs of Staff, the Joint Staff and numerous other consumers, and management of the DOD's Indication and Warning System. I will focus on what the Soviets have done and what they are doing to expand and improve their strategic power projection capabilities.

As we in intelligence endeavor to accomplish our task against the Soviet Union, we find ourselves confronted with probably the most paranoid and secretive national power structure in the world — the one housed in the Kremlin. Other speakers today will address this aspect of the Soviet Union in greater detail, but I must emphasize that it poses an enormous problem to those of us charged with reading the minds of the Soviets, to prevent them

from doing us ill. Their propaganda and disinformation frequently appease those nations and groups which would otherwise be concerned, often by obscuring the facts. Nevertheless, from what we have been able to learn, we in intelligence remain convinced that the Soviet Union does indeed continue to wish us ill and is preparing for the contingency of strategic nuclear war, both in terms of weapon systems and, too often overlooked, supporting systems. It is not presently clear whether they will restrain their developing programs as the U.S. tries to re-establish an arms limitation dialogue, but we don't think they will.

Soviet leaders themselves often say that the balance of political, military, and economic power which they call the "correlation of forces," continues to shift in their favor. They do not as often emphasize that the shifts they perceive in the "correlation of forces" most often result from intense,

expensive efforts on their part rather than from moral support for their system of social value. In fact, the continuing modernization of Soviet and Warsaw Pact military forces far exceeds the military assets they need to simply preserve their territorial integrity. Rather, the scope and pace of Soviet military modernization underscore the present leadership's goal of expanding Soviet global power and influence, while simultaneously improving their strategic nuclear war fighting capabilities.

At present, there are three identifiable groups of offensive strategic weapons in the Soviet military: Intercontinental Ballistic Missiles (or ICBMs), Sea-launched Ballistic Missiles (or SLBMs), and manned bombers. All these strategic strike forces are centrally controlled from Moscow by the Soviet National Command Authorities. The ICBMs are organized into what the Soviets call the Strategic Rocket Forces or SRF. There are currently about 1400 operational ICBMs, representing five separate classes, in the SRF inventory. The SLBM force includes a total of 950 missiles, of three separate types, deployed aboard 62 nuclear-powered ballistic/missile submarines. Their manned bombers are found in Long Range Aviation (LRA) and its naval equivalent, and these forces include a total of about 1000 aircraft.

Let's look first at the characteristics of Soviet ICBMs. As noted earlier, the Soviets now have a total of about 1400 operational launchers (see Figure 1). The SS-11 and SS-13 constitute the third-generation class of Soviet surface-to-surface missiles. They do not have Multiple Independently Targetable Reentry Vehicles (or MIRVs), have relatively poor accuracy, and are largely being phased out in favor of the fourth generation SS-17,



Figure 1

SS-18 and SS-19. This conversion is now virtually complete. Over half the deployed ICBM launchers now contain these more modern missiles. These new generation ICBMs represent significant advances in technology. They challenge the qualitative advantages the United States has enjoyed in the areas of accuracy and MIRVs. Moreover, they maintain the established Soviet advantage in throw weight. Their deployment has been accompanied by large expenditures in hard launch silos, ICBM launcher reloads, still more improved accuracy, and more flexible solid-propellant ICBMs (in lieu of the current liquid-propellant ones). Developments in the Soviet ICBM force represent a potential destabilizing factor in the strategic balance which must be constrained by verifiable SALT agreements, or countered by the U.S.

The second component of Soviet strategic forces is their 62 modern, SALT-accountable Yankee/Delta SSBNs, which have 950 SALT-accountable submarine launched ballistic missile (SLBM) launchers. They also have some older non-SALT-accountable ballistic missile submarines. Because of the improved range (over 4500 nautical miles) of their SLBMs — the Delta subforce can reach the United States from Soviet home waters. In addition to the 62 modern SSBNs currently in the operational order of battle, more Delta IIIs are believed to be under construction. Also the first of a new class of very large SSBN, the Typhoon — the length of which (530 feet) nearly equals the height of the Washington Monument — was launched in September 1980. The 20 missiles this new SSBN will carry are expected to use solid propellants and be MIRV capable.

The manned bomber also remains an integral component of Soviet strategic forces. Weapons carried on the Backfire, Bison, and Bear bombers are evenly divided between gravity bombs and air-to-surface missiles. The Soviets continue to produce bombers; they now have about 300 of these types with about 30 Backfires per year joining the force. The new Backfire bomber is becoming an increasingly significant portion of the force. Some 140 of these aircraft have been deployed in Long Range Aviation (LRA), and Soviet Naval Aviation. When launched from Soviet Arctic bases, or from deeper bases if refueled, the Backfire is capable of delivering weapons anywhere in the United States.

There are about 30 Bisons that have been reconfigured as tankers and they may be looking at modifying some IL-76 Candid transports for this purpose. Some Bears are configured for reconnais-

sance missions. In addition to the heavy bombers, the LRA has some 400 TU-16/Badger and TU-22/Blinder medium bombers. These forces could be employed in an intercontinental role by using established staging bases on the Soviet periphery, but more likely will be used against targets closer to Soviet borders.

An overall assessment of the Soviet strategic nuclear threat must include an appreciation of defensive as well as offensive forces. The Soviet emphasis on strategic defense contrasts sharply with ours. The Soviets retain a strategic defense establishment consisting of 10,000 operational surface-to-air missile launchers (or SAMs), 6,000 air surveillance radars, and 2500 dedicated interceptor aircraft. They continue to upgrade these forces and are still deploying the low altitude SA-3 system, the SA-5 high altitude area defense system, and a new strategic SAM, the SA-10, as well as new interceptors.

The Soviets currently maintain a total of 32 anti-ballistic missile launchers for the defense of Moscow and continue to upgrade their early warning radar systems. In addition to the assets dedicated to the strategic defense of the homeland, the Soviets also have large numbers of frontal aviation aircraft and ground force SAMs to augment their air defense. What we know of them, however, leads us to believe that planned U.S. low altitude tactics and systems can be successful against these Soviet defenses. However, the U.S.S.R. is pursuing R&D efforts on components for a new ABM system and is continuing an aggressive development program in radars and electro-optical systems designed to improve the low-altitude and passive defense capabilities of their surface-to-air missiles.

We are also particularly concerned about Soviet investment in advanced technologies for strategic defense. It's in the area of directed energy weapons that a revolution in military technology could occur. The scope and degree of the Soviet commitment is quite large, with facilities known to be engaged in high energy laser development growing substantially in the past decade. There are also

indications of substantial Soviet interest in particle beam technologies which may have application for defensive weapons.

In other matters, during the last several years, the U.S. intelligence community has become more aware of the magnitude of the Soviet civil defense

efforts. These efforts are led by a Deputy Minister of Defense who directs about 115,000 full-time civil defense personnel. The annual cost of the program is at least the equivalent of \$2.3 billion dollars. The civil defense program includes protection for all major sectors critical to survival of the Soviet staff, including hardened key headquarters; dispersed and hardened command and control facilities with hardened communi-

cations equipment; shelters for key industrial personnel and equipment; procedures for reconstituting essential industrial capability; and planned evacuation or sheltering of the urban population. From the nature of these activities and voluminous Soviet literature on the subject, it is evident that the Soviet civil defense program has at least these three objectives: survival of the leadership, reduction of casualties, and distribution of essential supplies.

In sum, the Soviets have made clear through their actions that they reject the Western doctrine of mutually assured destruction (MAD) and reject the notion that nuclear war is suicide.

Next, I would like to add to the scope of the theme of this symposium some consideration of Soviet expansionism as it applies to strategic warfighting, both nuclear and non-nuclear. In the last two or three decades, the Soviets have made largely successful efforts to improve their overall strategic posture, at our expense, in terms of access to facilities and resources.

We all happily remember their failure during the Cuban missile crisis in 1962, and their ejections from Somalia and Egypt. The Cuban missile situation, in particular, was a clear attempt to gain a strategic nuclear warfighting advantage through geographic position. However, though it and other related initiatives have been defeated, we cannot

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rest on our laurels, for their near-worldwide campaign continues with emphasis and success — and has not received the publicity and attention it deserves.

The Soviets have developed in the last few years a large and effective blue water navy, as well as a merchant fleet of over 4,000 vessels, which challenge us continuously for control of strategic maritime areas. An example is their gradual development of naval power projection around Africa. Their major naval surface combatants are never far from the sea lanes over which resources flow to the United States, and their intelligence-capable merchant vessels help them monitor the locations of our forces.

Another concern is their penetration into the western hemisphere, particularly their forces and intelligence assets based in Cuba. The MIG-23 Flogger is in Cuban hands and is only a couple of hundred miles from major U.S. targets. Reconnaissance and anti-submarine warfare (ASW) configured Bear aircraft are flown to and operated from Cuba by Soviet crews, to reconnoiter our defenses. As has become well known, they have ground forces on the island, and they undoubtedly have other intelligence assets of major capability located there.

There are many facilities to which the Soviets have access from which they could, or do, operate strategic nuclear-related forces, outside their own territory and the Warsaw Pact nations. While we do not believe these facilities pose a current threat in terms of nuclear war fighting, they do have that potential. They also provide the Soviets with vital capabilities to monitor our actions and tend to diminish our flexibility.

Of no less impact has been the progressive expansion of Soviet influence through surrogate warfare, and the establishment of military relationships with key states in critical regions of the world. In Asia, the Vietnamese are the major Soviet surrogate; in much of the rest of the world, Soviet interests are pursued by the Cubans. There are 15 countries where Cuban military personnel are known to be stationed (see Table 1). There is an especially large contingent of 13,000 in Ethiopia, and in Angola 20,000 Cuban troops have been confirmed engaged in combat in recent years to help the Marxist governments remain in power.

Supplementing the efforts of Cuban soldiers are the Cuban civilians located in 24 countries — over 15,000 (see Table 2). And of course the Soviets don't have all their work done by others: they have their

own 132,000 personnel in 19 countries (see Table 3). Those in Ethiopia, Aden, Vietnam, Angola directly support some of the reconnaissance and naval operations I mentioned earlier.

#### **CUBAN WORLDWIDE MILITARY PRESENCE**

COUNTRY	NUMBER OF PERSONNEL	COUNTRY	NUMBER OF PERSONNEL
Angola	20,000	Madagascar	200
Benin	20	Mozambique	350
Congo	300	Nicaragua	1,200
Equatorial Guinea	50	Sierra Leone	100
Ethiopia	13,000	South Yemen	500
Grenada	6-10	Uganda	25
Guinea	200	Zambia	80
Guinea-Bissau	80		

ESTIMATED TOTAL: 36,115

Table 1

#### **CUBAN WORLDWIDE CIVILIAN PRESENCE**

COUNTRY	ADVISERS WORKERS	COUNTRY	ADVISERS WORKERS
Algeria	60	Kampuchea	20
Angola	7,000	Laos	150
Benin	20	Libya	35
Cape Verde	15	Madagascar	10
Congo	100	Mozambique	800
Equatorial Guinea	50	Nicaragua	3,000-5,000
Ethiopia	600	Panama	100
Grenada	255	Sao Tome e Principe	100
Guinea	220	South Yemen	100
Guinea-Bissau	150	Tanzania	60
Guyana	20	Vietnam	300
Iraq	100		
Jamaica	70		

ESTIMATED TOTAL: 13,135-15,135

Table 2

#### **SOVIET WORLDWIDE MILITARY AND CIVILIAN PRESENCE**

COUNTRY	NUMBER OF PERSONNEL	COUNTRY	NUMBER OF PERSONNEL
Afghanistan	87,000	Madagascar	370
Algeria	8,500	Mali	635
Angola	700	Mozambique	500
Congo	850	Nicaragua	50
Cuba	12,000	North Yemen	475
Ethiopia	2,400	Peru	175
Guinea	375	South Yemen	2,500
India	1,550	Syria	4,000
Iraq	8,000	Tanzania	300
Libya	2,300		

ESTIMATED TOTAL: 132,680

Table 3



To bring this all together, let me end by saying that those of us in intelligence who are charged with keeping tabs on all that our potential enemies might be capable of — or might be trying to do — have been perhaps the most concerned segment of the Western body politic. As we added to the list of challenges posed each day by the Soviets, it didn't seem to us that the list of useful proposed solutions grew nearly as fast, and concrete steps to counter the threat seemed even slower to take effect. There's been an indication of a healthy change in the recent past and we sincerely hope that forums such as this one will help keep the improvements coming.

**Question.** If you were sitting in the Kremlin, what weight would you give to China?

**Brown.** Well, they are apparently considerably concerned with what's going on in China as evidenced by what they've done along their border; by their buildup in the Far East, without any draw-down in their NATO capability; by the locations of many of their ballistic missiles, which pose a threat to China; by the buildup in terms of fortifications along the border. There is no doubt that the Soviet leaders are considerably concerned about China. Perhaps I would say they are more concerned than I would be if I were Soviet at the current time. Their concern with China has not, though, detracted one bit from their investment in forces to fight the war in Central Europe, nor to curtail their exporting subversion throughout the world. So they are very concerned with China and I think they will continue to be in the future and I hope we can encourage them to continue to consider the Chinese to be a significant force.

**Question.** Do you favor the supply of American arms to China?

**Brown.** I'd like to see it for both Chinas. Yes, I do.

**Question.** Would you estimate the loss to Soviet military effectiveness resulting from the situation in Poland in the last year; it was the largest satellite army?

**Brown.** As I mentioned earlier, one of my jobs is current intelligence and we've been very busy this last year. We are approaching what we believe to be our third crisis in Poland. The earlier two times we saw Solidarity doing things that no country has ever done before to the Soviet communist party, and accommodations were reached. We anticipate that there shall be another crisis sometime in the near future. As far as impact, Poland is the lynch pin of the Soviet endeavor against the war in Central Europe. Without the freedom of LOCs there is no way they can support a war running out of East Germany. It is for that reason that probably of all the satellites, East Germany, I believe, is the most concerned, although the leaders of Hungary, Romania, Czechoslovakia, and so forth, are also concerned. But I think that Soviet war planning, without a firm right-of-passage, without some association and support from the Polish military, will be considerably weakened in the near future.

I think the Soviets have two hurdles. The first is to somehow accommodate Solidarity without having an immediate adverse impact on their relationships with the other Warsaw Pact countries. Secondly, it's going to be a long time I think before any Kremlin planner is going to have confidence in the contribution that a Polish soldier would make to war efforts in Central Europe. I think that's something they have not faced yet, and I think that downstream that idea will start to sink in. How it will be reflected in their actions is very hard to say. To go in and occupy would be an extremely expensive program that would set them back economically, militarily and politically for years to come. I think that is something they'll choose to avoid.

## **Ambassador Edward L. Rowny**

**Special Representative for Arms Control and  
Disarmament Negotiations  
Arms Control and Disarmament Agency**

**I** will talk to you about SALT, or as it is now known, START. They're both acronyms — what my aide used to call anachronisms. I don't think START is an anachronism, and I will try to convince you that it is not. During SALT negotiations my wife became so bored with the acronym that she created the acronym PEPPER — Poorly Evaluated Plans and Policies Executed Righteously. It is going to be my job to see to it that we don't have plans that are poorly but properly evaluated and policies that are not executed righteously but with some degree of balance.

In negotiating with the Soviets, Americans do a great deal of mirror imaging. This isn't just accidental; it comes about by virtue of a long heritage, a heritage that is not the same as that of the Soviets. Our historical experiences are not at all similar. Too often we do not realize this and instead we, as Professor Pipes said, "make our own guidelines

and then try to follow them." Sometimes these guidelines have no relation whatever with what is in the Soviet mind — no relation to reality. After some six and one-half years of face-to-face negotiating with the Soviets, I discovered this to my sorrow. As I delved more deeply into Soviet history and studied their sociological and political culture, it became clear that we and the Soviets spring from completely different historical and cultural backgrounds.

Unlike us, the Soviets do not have much of Greek rationalism in their makeup. Unlike us, they do not believe that all problems can be solved, either with computers or with analytical methods. Unlike us, they do not have Roman law in their makeup and do not have the same respect and high regard for law that we do. Our separation of Church and State is a completely different concept from theirs. After you work with the Soviets over a period of time,

and study them, you find that they don't have the same objectives. They look at problems differently and they certainly don't negotiate the same way we do.

Negotiating with the Soviets is like piloting an airplane — it's about 98 percent boredom, one percent stark terror, and one percent humor. Early in the SALT II negotiations, I tried to establish some rapport with the Soviets. I said to one of my counterparts: "Look here, we talk about these issues before we come to Geneva. We try to take your point of view. We have our A Teams and B Teams and negotiate between ourselves as though we were Americans and Soviets at the negotiating table. Our position is somewhere in the middle of this table. It is what we think is a reasonable position, one that we would accept if our positions were reversed. But you Soviets come in with a position over at that wall." "Well," the Soviet general said to me, "we don't believe our position is over at the wall. But don't do us any favors. If you think we're over at the wall, then you should come in over at the opposite wall." He added: "Have you ever tried to buy a rug in Persia? You don't start with your bottom line." However, we in fact often start with our bottom-line position. We want to be credible, we want to be believed, we want to appear to be reasonable. The difficulty is that we then feel we can only be reasonable if we make further concessions and fall off our bottom-line position.

The Soviet idea of 50-50 is different from ours. When Khrushchev was in this country he visited Disneyland where he boasted about the quality of Russian sausage. "Our sausage," he said, "is the best in the world; it's made of rabbit meat." "Pure rabbit meat"? he was asked. "Well, it's adulterated a little." "What do you mean, adulterated a little?" "Well, we adulterate it fifty-fifty. One rabbit, one horse."

I have my own version of the Soviet concept of 50-50. Early in SALT II, trying to break the ice with the Soviets, we took them on a boat ride on Lake Geneva. The social atmosphere was rather stiff. To try to loosen things up I took out my harmonica and began playing "Mi Communista" and a few other Russian songs. After a while the Soviets started tapping their feet and singing and as a result the party livened up. After I had run through my repertoire, Minister Semenov, the Soviet chief negotiator, took off his sailor's cap and went about collecting money: Swiss francs, French francs, dollars, rubles, whatever anybody had. He then came around to me and smilingly said, "General

Rowny: fifty-fifty." I said, "Fine," and held out my hand. but Semenov gave me none, instead he put all of the money in his pocket. "Chto eto," I asked, "What's going on?" "Fifty-fifty," Semenov repeated. "You had the pleasure of playing for the audience and I'll have the pleasure of spending the money: fifty-fifty."

This leads me to several of the more serious aspects of negotiating with the Soviets. At an early occasion in the SALT II negotiations, I said to one of the Soviet generals: "Look, we have six points at issue. This problem is not hard to resolve. I think we could give you three of the points and you can give us three points. We can reach a reasonable compromise." As you may know, there is no such word in the Russian lexicon as "compromise." It is a word they've derived from us. The concept of compromise is foreign to them. The next day, at an official session, I said, "We're prepared to give you A" — and I spelled it out, "and then B and C." At this point the Soviets arose and started to make for the door. "Wait a minute," I said, "I haven't finished." One of them said: "As far as we're concerned, you have. You told us what you're ready to give up and we agree with you." I said, "But I haven't gotten to D, E, and F." He said: "We're not interested in those. You've told us what you're ready to give up and that's that."

The next time I met with the Soviets I said, "You give us D, E, and F and I'll tell you what we're ready to give you." They didn't like that at all. "What do you think we are, gluppy? crazy?" They made it clear they were not going to negotiate in that way.

I wish I could go on with examples to outline for you the problems in trying to negotiate with the Soviets. They have a different mind-set from ours. They have their own way of thinking about a problem.

Let me make a few other points. First, it is my firm conviction that it is in the interest of both our nations to arrive at an agreement. I know that we feel that an agreement would be in our interest and I believe that the Soviets do also. I think that they not only want, but in some respects, need an agreement. I won't go into all the reasons why I believe that, but one of them is that they do not want to get us aroused. They recognize that we have a superior technology base and that we're innovative. They don't want to spur us into an arms race they know they cannot win.

I've learned from my own experience that the Soviets understand and respect strength. Now that we are beginning to turn our country around and

build up the strength we need for our own security needs we are also gaining the negotiating leverage for reaching a sound and equitable agreement with the Soviets.

There is no objective reason why we can't, if we have to, compete effectively with the Soviet Union. If one were to stand off at some distant planet (and I won't say Mars for obvious reasons, but instead say Venus) we could look at the subject objectively. One could say: "There's the United States with twice the gross national product of the Soviet Union. And if you add to that the GNP of the allies of the United States and pit it against the GNP of the Soviet Union and its satellites, the former have four times the GNP of the latter. Therefore, there is really no objective reason why we cannot compete with the Soviet Union if we have to." I'm not saying that it would be entirely painless; it would undoubtedly cut into our social needs. But fundamentally, there is no reason why we can't compete militarily with the Soviet Union and they know it. That is one of the reasons they'll want to reach an agreement with us before we reach the zenith of our buildup.

In a future START agreement, we cannot rely on some of the relatively simple units of limitation we relied on before, such as counting launchers of strategic delivery systems. The Soviets simply developed better weapons and packed more destructive power into those launchers. Then they put more warheads on their missiles. As a result we will need to adopt some better unit of measurement, such as limiting numbers of missile warheads and throw-weight. This will give us a more clear-cut and definitive way of comparing their combat power to ours.

Another difference from the past is that we cannot, as the Soviets would like, base verification solely on national technical means. They have insisted in the past that only national technical means be used as the basis for verifying agreements. This notion of theirs has to change. We are investigating cooperative measures, similar to those we reached in SALT II, and are looking at employing intrusive measures. But relying simply on national technical means will not do the job of verifying an agreement.

Finally, any agreement we enter into with the Soviets must contain some significant reductions. I don't like to use the words "deep cuts" because I don't think they are attainable. However, significant reductions are in order. Unless and until we can turn down the curve of Soviet buildup, we

don't really have an agreement genuinely limiting strategic offensive arms. I happen to think that such an agreement is possible and that we're headed in the right direction. Personally, I'm optimistic. I wouldn't have accepted the job of chief negotiator if I didn't believe that an acceptable agreement could be negotiated with the Soviets. I think it can. But we have to change our ways of doing business and have to change some of our ideas. We have to have a lot more confidence in ourselves. First, we have to take care of our security needs, expensive as that is. Once that is done, we'll be in a better position to negotiate a satisfactory agreement with the Soviets. While it will not be easy, it will come about. And I would like to be a part of that process.

**Question.** Do you believe that we will structure some kind of timetable in the near term for your activities.

**Rowny.** Yes. I think a timetable is shaping up. You know that theater nuclear force (TNF) negotiations will start in Geneva on the 30th of November 1981. We are now working on the integration and policies of both TNF and START and I would look for START to follow close on the heels of TNF. You also know that Secretary Haig has repeated publicly what was made a part of the Rome communique of May 5, 1981, namely that TNF will be negotiated in the SALT context. These two negotiations will be closely integrated.

**Teller.** There has been, here and throughout the whole discussion, an emphasis on arms race and the desirability to curb it. I happen to believe that an arms race does not exist. An arms race exists when both sides have comparable weapons even apart from the very important question of comparable aims. But if you have comparable weapons, then you can ask who has more, or maybe who has bigger ones. Instead of this situation, I believe that we are involved in a race of technology. More than that, we are involved in a race of secret technology and this is really what will determine our future. This has been a brief introduction — now comes the question.

How do you negotiate about the limitations of new ideas which you are not willing to name?

**Rowny.** Dr. Teller, let me comment on the first part of your question and say that I agree with you. I did not use the words "arms race" — if I did it was a slip. But I don't think I used it — because I agree with you there has not been an arms race. Ex-Secretary Brown has said that "when we build, they build, and when we show restraint, they

build." The Soviets have built at an unrelenting pace for the last 15 years which, as you know, is two to three times our rate. In short, there has not been an arms race — we are now trying to catch up.

As to your question, I touched on the comparative advantage that we have over the Soviets. I

think this is one of our greatest strengths — the Soviets look up to us in awe over the way we innovate. They too have good scientists, especially in basic science. But they cannot stand up to us in capitalizing upon transforming basic science into good hardware. Just compare our space capsules with theirs. The Soviets respect and fear our technological ability and would like to constrain it. I don't know of any way to bottle up the

war of ideas and I'm glad this is so. In technological innovation we enjoy a comparative advantage. If the Soviets continue to build up their strength by pouring so many resources into their effort and if we can stabilize the situation by technological innovation, this is a good thing to do. So in short, I don't know how to curb new ideas. But if new ideas lead to deterrence and stability, I'm in favor of them.

**Teller.** May I name a precedent? We were trying to establish ABM. That needed new ideas. We thereupon entered into a treaty which very properly did not restrict research but restricted deployment of ABM. The inevitable consequence was that since there was no prospect of deployment, our research was underfunded. Furthermore, I'm sorry to say, although the quality was high, it was not as high as it could have been or should have been. At the same time, the Soviets went ahead with research as far as we can tell. (Because of our peculiar rules of security, we cannot tell even what we know about Soviet research.) The ABM treaty put an artificial limitation on our research. Although that was not spelled out in the treaty, it was clearly the effect of the treaty.

**Rowny.** I agree. I think Dr. Teller's statements stand on their merits. I can only emphasize my chagrin over our inability or unwillingness to fund properly our research and development in the

ABM field. As you know, the Soviets have been outspending us four to five times in this field. I think this bodes ill for a possible Soviet breakout in the ABM field.

**Question.** In a recent announcement by the President regarding the modernization of the strategic

force package, he alluded to space-based ballistic defense in very cryptic terms. General Brown talked about the Soviet Union's directed energy weapons program. Are you at the Arms Control and Disarmament Agency pursuing negotiations along those lines as part and parcel of the package for SALT that you're undertaking?

**Rowny.** No, we're not pursuing any negotiations in this area. There is an intensive review

going on of the ABM treaty. As you know, when we signed the treaty in 1972 we said it would be reviewed every five years. It was examined in 1977 rather cursorily. I think it will not be perfunctorily or cursorily examined in 1982. But we are not negotiating a space treaty.

**Comment.** But the ABM treaty only limits them insofar as describing such terms as other physical principles. It doesn't do anything to curb the spread of nuclear weapons.

**Rowny.** You're right; there would need to be some interpretation of what are "other physical principles." We have to be sure that if we should have some breakthrough that would greatly enhance our position it could be interpreted as a new physical principle. We should not be under any illusion that we'll have a free ride in this area.

**Question.** General, you said that the Soviets respect strength and presumably respond in a more positive way from our point of view if we deal from a position of strength. Why have we picked TNF as a starting point to the current phase of arms negotiations. We're starting out with paper missiles against realities. They have all the advantages, and we have none. Can you explain that to us please?

**Rowny.** I guess the best explanation I can give for that is that the situation didn't develop on my watch. In the interest of getting some ground-launched cruise missiles and some Pershing II's

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into Europe, this Administration agreed, as had the past Administration, to a two-track approach. It is proper for us to live up to our commitment of getting modernized forces deployed in Europe. The Administration obviously considered it good for Alliance solidarity to open TNF negotiations at an early date.

## **Dr. Marshall D. Shulman**

**Director, Russian Institute  
Columbia University**

**O**ne interesting thing about the subject we have — National Security — is that it involves a number of different kinds of competence. From an intellectual point of view, it is among the most difficult and complex fields. As you can see from the program, it involves scientific and technological inputs, political inputs and political judgments. In fact it's interesting that the program, as set forth, is like a sandwich in that we have the questions of national security policy at the beginning and at the end and the hardware questions in between. This is as it should be. But one of the problems is that, while the scientific and technological sides of the problem may be subject to scientific methods and measurements and to scientific experience, the political side is not. It is far from being an exact science, and judgments differ.

Indeed, when we are dealing with the Soviet Union, we're dealing largely with elements that are only partially known. In the Rorschach test that

psychologists use, they put ink blots before a patient and the patients project and tell what they see; and it is like that in the study of the Soviet Union. People project sometimes out of their hopes, sometimes out of their fears. They see different things in interpreting the unknown. And for that reason there are wide differences of opinion, differences of judgment. I find myself very much in disagreement with a good part of what has been said so far in this panel, and 15 minutes is not very long to express all that. (If ESD is part of the sponsorship of the hardware side of the program, could it be that ESP is the sponsor of the political side of the program?)

Paul (Doty) asked me to talk a bit about the current state of relations with the Soviet Union, and how it serves as one of the factors involved in the determination of our security policy. I think we will all agree on some things. We'd make some stipulations that probably every one of us would sign — that relations with the Soviet Union are bad and

probably getting worse. They have been bad for most of the time since the Soviet Revolution, with only intermittent periods, sometimes governed by illusions, as people said. I think Dick Pipes (he's an old friend of mine) is absolutely wrong in saying that it is the liberals who have the illusions and the conservatives who have not. I don't know if I qualify as a card-carrying liberal, but I must say that people who care about freedom or justice or human dignity can't help but find the Soviet system repugnant in the extreme, whereas I have never seen such enthusiasts for the Soviet Union as some of the grain merchants who were not sharing liberal illusions by any means.

This is part of the problem of the present administration too, I think. Ed Rowny is an old friend of mine and I respect him, and agree with a good part of what he said. I think he's right in saying that the Soviets are difficult in negotiations, and that their culture is different from ours, and that they have different objectives. I think all of that is true. It isn't a question of making the Soviet Union look pretty. It isn't a question of hard or soft interpretations. It is a question of an accurate understanding of the problem we face and how to manage it, and whether our own responses are effective and appropriate or not. That's the issue. (And it's difficult to make that clear. I have scars on both sides of my body, because people sometimes think that I represent a soft view, or naivete toward the Soviet Union.) We must define the problem in as accurate terms as we can.

We would, I think, agree on some things. We would agree that the military competition between ourselves and the Soviet Union is probably going up. Whether you call it an arms race or not is partly a matter of whether you think we have been all out. And we have not been, obviously. Nor have the Soviets for that matter. But we have not been standing still either. From the Soviet point of view, as Ed Rowny suggested, there is respect for the American economic and technological base. And a fear of what we can do.

It is a question of whether it is true, as Dick Pipes

says, that the countervailing deterrent, that is, the destruction of cities and a good part of the country, would not be sufficient to deter the Soviet leadership. This is an important judgment to make. If you think, as Dick suggests, that it does not — that only a counterforce capability could serve as a deter-

rent — that is a very significant judgment. My belief is that it is not borne out by anything that I have observed or read in the Soviet literature or Soviet behavior. I think it is important to know whether that is a sound judgment.

We would all agree that the Soviet Union is an expansionist power; it seeks to expand its influence wherever it can, by whatever means it can, in whatever circumstances seem to offer more bene-

fits than costs. We would all agree, I think, that the Soviet Union has put an enormous amount of effort into its military buildup, particularly in the last 15 years. There has been a straight line per annum increase in the allocation of resources to the military sector, and it has given the Soviets added capabilities both conventional and nuclear. We would all agree, I think, that the Soviet system is a repugnant one from our point of view; it does not share our values or our objectives in the world. Its objectives and purposes are in conflict with our own. There is, I think, no serious disagreement with those propositions.

We would perhaps have some differences as we try to face the paradox of Soviet strengths and weaknesses. Some would emphasize the strengths and some the weaknesses, and both are part of the Soviet situation. Clearly, in military terms, the Soviet Union is a good deal more capable in both nuclear and conventional capabilities than it was a few decades ago. Clearly it has some serious political problems and economic problems. Its economy has continued to grow, but its rate of growth has been flattening out. It has very serious limitations in productivity, both agricultural and industrial, and in the advanced industrial sector of its economy it has lagged very seriously. And what is interesting, what is important about that, is that the limitations on its economic growth have been

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structural — that is, they have grown out of institutional problems which the Soviet leadership has simply not been able to solve. That isn't to say that the Soviet Union is about to collapse, but it has very serious problems — in many ways a good deal more serious than the kind of economic problems we have.

The Soviet Union clearly has serious vulnerabilities in Eastern Europe, of which Poland is perhaps just the beginning. It faces a no-win situation there, which may have profound consequences for the Soviet Union all over Eastern Europe and internally, partly as a consequence of its own economic problems, partly as a result of the nationalism that persists there. It has very serious problems, as General Brown indicated, with regard to China, which occupies a substantial portion of its forces at the present time. And although it has made some gains in foreign policy, it has also had some losses. It is a mistake, in my judgment, to believe that recent Soviet expansionist activities in Angola, Ethiopia, Afghanistan are a result of a shift in the balance of strategic power. The pattern in those countries is not greatly different from what the pattern of Soviet policy was before. If the strategic relationship now were no different than what it was in 1960, it would not, in my judgment, have affected Soviet behavior in those countries.

The Soviet expansionism, where it has occurred in Angola, Ethiopia, and Vietnam, has primarily been as it has always been: an exploitation of opportunities which have arisen out of the flux of international politics. We live in a time of extraordinary fluidity in international politics — a time of upheavals. We witnessed just this past week how snuffing out the life of one man (Anwar Sadat) can change a political picture, just as the fall of the Shah before that created a great change for us in the strategic picture in the Persian Gulf.

In these cases, and in Angola and Ethiopia, what the Soviets did was exploit an opportunity which they didn't create, where they were a complicating factor rather than a prime cause. Nor do I believe that their behavior in Afghanistan would have been greatly different if the strategic balance were greatly different than it is. And their behavior there was not different than it has been in other cases of border security problems. That is not to justify or excuse what they did — it was a clear violation of international norms. It is reprehensible; this Government said so. We weren't in a position to fight it militarily, but it clearly was reprehensible — but it wasn't a departure in Soviet policy.

I question, therefore, the statement that has weighted many current judgments of the Soviet Union: that the United States stood still while the Soviets were building up, and that this resulted in a shift in the balance of power which in turn emboldened the Soviets, made them more aggressive, and resulted in Angola, Ethiopia, Afghanistan, etc. I question whether that is a logical consequence. I question it; I think it needs to be examined. Please don't misunderstand me: I don't in any way mean to exculpate the Soviets from what they do. I say that theirs is an expansionist policy, it has been and continues to be, and probably will continue to be. But it is a question of seeing the problem accurately — because the effective response is partly military and partly non-military.

Clearly, we do need to pay attention to the military balance, and please do not think that I am arguing the contrary. But the question is: What is an effective response; what kind of response is effective? The differences of judgment about the nature of the problem may affect your thinking about the kind of response that is necessary. As I say, it is partly military and partly non-military, and within the military it depends in part on your judgment about what is the U.S.' optimal security interest. That, in part, rests upon differences in judgment on intentions. It isn't just a question of measurement of capabilities; this is the old problem for us all. And that affects such a term as the "window of vulnerability."

In my judgment there is a vulnerability, but it is a mistake to use the image of the window. The term "window of vulnerability" implies that there is a period — some begin it sooner, some later — during which the Soviets have the capability of attacking our fixed-site land-based missiles, and that, after we take certain actions, that vulnerability will no longer be there.

There is a problem there — clearly, there is vulnerability that affects both their fixed-site land-based missiles and ours. The question is: Do you regard the Soviets as so irrational, so unaffected by the destructiveness that would result from the exchange, that they would, as a matter of practice, think that they could take out our fixed-site land-based missiles without suffering the destruction that could come from a general exchange? That is a matter of judgment. It depends on how you read the Soviet literature, how you see them, how you understand Soviet intentions, whether you think they are irrational or not. It would be an act of high irrationality. It's not just a question of whether it is

technically possible. It's a question of whether that becomes a plausible possibility that requires an immediate fix, after which it will no longer be there. My judgment is that the problem is more serious than the image suggests because it isn't going to be fixed — the problem of vulnerability of land-based missiles is one we must live with, one the Soviets must live with, one that won't be solved by any of the measures now being discussed. But that's a matter on which judgments differ.

The implication, I think, of the kinds of distinctions I've tried to make is that, if you put a primary value on our security in terms of avoiding the destruction which comes with nuclear war, and on the preservation of the values of our society, both here and in the areas of vital interest to us, you would put more emphasis on the stability of the systems than on the kind of reductions Ed Rowny is talking about. Ed is talking in terms of the kinds of reductions that the Chiefs say we can live with. In my judgment it doesn't really make a great deal of difference whether we are operating at 2400 strategic delivery vehicles or 2250 or 2000 — that doesn't affect the kind of process that occurs when we're both engaged around a crisis point and the risk of escalation. What does make a difference is whether the systems we have are stable or not — stable in the sense that they can survive an attack so we don't have to be trigger-happy.

For that reason I strongly support the basic thrust of this conference and its attention to C<sup>3</sup>, which seems to be vital not only for war fighting capabilities but also for the kind of stability that is essential in the nuclear balance. But it does seem to me that if we pay attention to the factor of stability, if we understand the necessity of it, then we define differently both the kinds of systems important to us and also what our objectives in negotiations may be. It isn't that we should have any illusions about the Soviets being a mirror image as Ed said; I agree with that. They don't negotiate the same way we do. They don't have the same values. They have conflicting purposes. But there are some areas in which our interests are not in conflict with theirs, and I believe it is an error to think, based on Soviet military literature, that they are in practice committed to the fighting of limited nuclear wars. It seems to me that there is nothing in the Soviet behavior, or in the serious literature, that really warrants that conclusion.

You can find quotations in the Soviet literature, especially from the services, about what their function is in time of war. And Soviet ideologues can find similar things in our literature. But you would be making a mistake, and they would be making a mistake, to assume that such proposed operating procedures are reflected in the SIOP, in targeting or actual operating plans. There is a danger in this field, I think, of what Mr. Justice Holmes called in one of his decisions "the parade of imaginary horrors." Many things are possible, and it becomes a matter of common sense and judgment about which things are feasible, which things you must take into account as real possibilities that you have to protect against.

One of the problems we have in the approach to the arms control negotiations that Ed Rowny talked about is that it has a certain time urgency, that we are in a period in which both sides are bringing new systems out of R&D and into deployment. Many of these new systems are less stable, less verifiable than those we've had. It seems to me probable that we will be approaching a time — whether it is a few years away I'm not sure — when any kind of stabilization of the strategic military balance through negotiations is going to be ever so much more difficult than it has been, and it may approach the point of being unmanageable. That doesn't mean the end of the world, necessarily. It does mean that the possibility of negotiations may diminish over a period of time. The kind of timetable Ed (Rowny) laid down seems to me not to take sufficient account of that problem — that our realization of own self interest in trying to stabilize the strategic side of the competition between the two countries may come after the problem has passed the point of manageability.

Finally, there are other aspects of security that we should have in mind, although they're not on our program: the problems that are presented by the non-military side. For example, our relations with our Allies are vitally important. It is apparent that serious deterioration of relations with our Allies is possible. This is critical to our own security. Part of the problem is that there is no conviction in Europe that we're facing our security problems with moderation or sensibility. This leads many people in Europe, even those who have been friendly with the United States, to seek to distance themselves from us. There are other

reasons for the growth of pacifism and neutralism in Europe, and it should be a matter of concern. It widens the gulf between ourselves and Europe. This is a major security problem which also needs attention.

And, as I suggested to you before, many of the problems in the Third World particularly, and some in the developed world too, stem from causes that the Soviets didn't create, but which they do exploit. A response simply to the order of battle, that is, to the military capabilities that the Soviets have — or a military response to problems like those General Brown showed us on his charts — is not adequate to deal with the problems. It may be necessary, but by itself insufficient, where the problems are not created by the Soviets and where they aren't primarily military.

We have seen just within recent weeks and years how the upheavals, the instabilities oftentimes come about through internally generated sources. They may express the frustrating problems of nation-building in the large part of the world that has only recently come into nationhood, of the race between population and food, of the problem of resources, the problems of tribal conflicts or border conflicts that can affect our future. It is very difficult for us to say today where our crisis points are going to be in a short time. There is a high degree of unpredictability about these events. But we do know that many crises stem from political and economic causes as well. This is not to say that it is an either/or proposition. It means we do have to pay attention to the military balance, particularly with regard to its stability, but that we cannot be content with that alone. That is not a sufficient response to the security of the United States and all that we cherish and want to preserve.

**Kahn.** Would you argue that there is really no basic difference in the military thinking of the Soviet Union and the United States? Obviously, it's a question of degree. My impression is that the Soviets really intend, if a war is forced on them, to fight and win it. Obviously you have all degrees, but I'm talking about a question of degree.

**Shulman.** No, I would not argue that military thinking is the same there as in our country. It would be surprising if it were. There are a number of reasons for it. For one thing, a good deal of the theoretical literature about deterrence, particularly in the post-nuclear period, has come from

civilians; Herman Kahn himself has contributed a great deal to it. You don't find that phenomenon in the Soviet Union, where the civilian who messes around in professional military matters is pretty rare and on the whole does not have a high standing. There is not really a literature in the Soviet Union comparable to the kind of theoretical literature we have in this country. Most of what has been looked at for examples of Soviet thinking really is the literature of the Services about their functions in wartime. It's more like the stuff that's published at the various war colleges run by our services, in which there is discussion of what the mission of a service is in the event of war. There is, of course, the literature of fighting for the allocation of the ruble, which has some structural similarities, but it's different too. I don't mean to argue that the Soviets think as we do, or that the Soviet military thinks as we do. On the whole, the experience of much of the Soviet military is fairly parochial.

The second part of the question was, "Though they might not initiate a war, would they fight it if it were brought to them and fight it to win?" There has been a lot of discussion in this country about whether the Soviets think that they could win a nuclear war. In fact there is some Soviet literature, some exchanges in the military journals, about how to prevail in the event of a nuclear war. Most of the literature of that kind uses the issue of prevailing as a surrogate issue. That is, it really is a fight between the services, between the rocket forces, which essentially have the spasm notion, and the ground forces, which think there is a role for the ground forces in occupation of territory and in a continuing conflict. A good deal of the argument about prevailing really is a surrogate way of fighting the budgetary problem.

**Kahn.** Obviously, if you have a genuine belief, you are still going to use it as a surrogate for budget purposes. One of the reasons why it is an effective surrogate for budget purposes is that it addresses concerns that people really have. That is the position that I think I would take. I don't claim to be an expert here, of course.

**Shulman.** It's quite possible. I don't think there is a final answer to it, Herman. I don't think you can prove or disprove the question. It becomes a matter of judgment. For one thing, it's often the case with a good deal of doctrinal literature in this field that it is a rationalization after the fact, in

support of systems that you have procured for other reasons.

**Kahn.** This issue is so important, let me just add two or three things. There is no question in my mind that a good deal of the post-war Soviet literature was just *auld lang syne*. For example, the civil defense people didn't worry about the nuclear weapons until about '56. But when you build a shelter against a 500-pound general purpose bomb, it turns out to be quite useful against nuclear weapons as well. And my basic picture is that the Soviets have a better understanding of a nuclear war than we do. Not because they're smarter but because they are more traditional.

They talk about the revolution in military affairs but their revolution is not quite that dramatic. And secondly and much more important, their more recent thinking has been extremely intelligent. In other words, they went through a much slower evolution than we did, and they have some facts on their side. Their emphasis on evacuation today, for example, is very sound. Many in the U.S. have been pushing that concept for roughly 20 years and they don't find it a new idea, but it makes a difference of night and day in casualties, in recuperation, and so on.

**Shulman.** Herman is right in saying that the styles in which the two countries have approached the problems of the nuclear revolution have been quite different. The Soviets have often expressed the thought that the contribution of many of the theorists in this country is what they call intellectual calisthenics, and have sought to disparage it. And their approach is a much more traditional one, as Herman says. What conclusion you can draw from that I'm not sure. If you study the pattern of Soviet weapons procurement, it's much more regular than ours. It comes at fairly regular intervals, you can plot a series of fan-shaped curves at intervals that result from the planning ahead, and it has a consistency which we don't have. I suspect it has its irrationalities as ours does. I suspect it is also subject to the service competition problems as ours is, but at least it has regularity on its side and

it involves planning. It has less jumpiness, less discontinuity. And in that sense maybe Herman is right about being sensible.

**Question.** Ambassador Rowny referred to the enormous Soviet respect for the United States' capacity for innovation in developing new weapons systems. And yet throughout military history there's been an upward curve, which is now exponential, in lack of faith in new systems and the constantly increasing costs and delays involved in introducing new systems. Now, just about everything in the Western armory, from the M-15 rifle to Trident submarines, from the vulnerability of C<sup>3</sup> aircraft to electromagnetic pulse and so on, seems to indicate that our faith in this kind

of technological innovations might be slipping, and maybe there are some weaknesses in this. I wonder, what is the impact on Soviet thinking when these weaknesses are revealed?

**Shulman.** It is certainly the case that the Soviets have enormous respect for the superior technological base the United States has, not only in the military sector, but in the civilian sector. The Soviets have studied the spinoff effect we have in this country, which simply doesn't exist in the Soviet Union. You get a two-way spinoff here among defense, space and private industry and back again, in a way that the Soviets aren't able to do, largely because of the extreme compartmentalization of Soviet R&D in both the defense sector and the industrial sector. And although it is true that the Soviets have been spending a great deal on R&D now, and that it may be that they will reduce the gap in technology and innovation, they have a number of structural problems which are very difficult to solve.

As I mentioned to you, one of the problems they have in the civilian sector of their economy is in new industrial innovation — industrial technology. They recognize that there is a relationship between the civilian industrial base and the kind of technology on which the defense has to draw in facing new systems. This is one of the reasons why it was quite interesting that, in the debates in the Soviet Union on the present allocation of resources

**There is no conviction in Europe that we're facing our security problems with moderation or sensibility.**

that preceded the 24th Party Congress (the Congress was in '71, but the debates took place between '69 and '71) — there were many from the military sector who supported the civilian decision to put the emphasis on repairing the economic base, because they saw it as critical to the future of Soviet power. It wasn't that they were any less militant on behalf of power, but they saw that it was more important to repair the technological base than it was to pay attention to the immediate aspects of the arms race. They didn't ignore the buildup of course, but there was an argument about what the proportion of resources should be.

Now the Soviets are left with that institutional problem, which I would suspect, if you use the Soviet terminology, is a matter of internal contradictions. The Soviet economists have told them what they need to do about decentralization, use of

market forces, use of other devices to find ways of encouraging innovation, of giving incentives to innovations instead of disincentives as the system now does. But politically they have not been able to do it, because many people in the Party fear it would reduce the Party's control. And it is the case that if they ever were to do something about it, it probably would have fundamentally upsetting effects on the political system, and that is the reason that they haven't done it thus far. So although I think they may do a great deal about technology, and I think we have to pay attention to the resources that we put into R&D without a doubt, we ought not forget that this is one of those areas where the pluralism of our society clearly has marked, demonstrable advantages which the Soviets are not able to equal.

## Session I

### Question and Answer Period

**D**oty. We have heard during this session about the increases in Soviet strength, but also about their increasing political and economic difficulties. And, indeed, this is the pattern of decline of empires at least since Rome: overextension abroad and deterioration of the core at home. So it seems to me that we must begin to weigh the likelihood of the collapse of the Soviet system. No less an authority than Senator Moynihan says it will occur in this decade. Do any members of the panel think that this is a significant enough possibility so that contingency planning should be underway?

**Pipes.** I am keenly aware of the domestic and foreign problems of the Soviet Union. Their economy is in a shambles. Their dissent at home, though superficially suppressed, is very much alive. They are overextended overseas. They are finding themselves unable to defeat guerrillas in Afghanistan; they have a tremendous problem in Poland. All this is true. At the same time I think it is

extremely unlikely that there will be a collapse of the Soviet system. The reason is that even many of the people inside the Soviet Union who cordially dislike the Soviet system do not wish a breakdown of the system. This is because in the minds of most Russians — and I've talked to innumerable Russians, and as a Russian historian I would agree with them — the alternative to the Soviet system is anarchy. And anarchy, they feel, would be infinitely worse than what they have now. It could lead to racial war, ethnic war, class war, hunger and bloodshed unprecedented.

The most benign development, from our point of view and from the point of view of the people of the Soviet Union, would be the revolution of the Soviet system toward something more acceptable. That evolution in the Soviet system has to come from above. It would not happen as it has in Poland. The Soviet Union doesn't have the traditions of libertarianism Poland has, which makes any Pole naturally a patriot and a person who demands

his rights. That is absent in Russian tradition. In Russia you have a tradition of repeated reforms conducted by authority for the purpose of self-preservation.

The operative conclusion to that is that the easier it is for the Soviet system to survive without reform by obtaining credits, technology, and what have you from the West, by being able to expand with impunity into areas of the Third World, and by blackmailing the rest of the world through its nuclear power, the less the temptation to reform the system. On the other hand, when the difficulties of resolving their problems domestically are greater, when the risks of foreign intervention are higher, when our ability and willingness to respond to them is greater, then will their temptation and desire to reform the system be greater as well. By our policies we in the West can contribute a great deal to the kind of course Russia takes. Repeatedly in Russian history this has been the case, and I don't see why it should be different today.

**Rowny.** The Soviet Union cannot compete with us politically, economically or socially, or in gaining friends around the World. The only places where they have succeeded are where they have moved with force. It is the fact that they do put such a tremendous emphasis on force that could cause the Roman Empire to fall, and it is this great emphasis that they put on their military strength that we should worry about. Although we don't want to, we are forced to match that strength to take care of our own security. And that matching does what Dr. Pipes says: it gives the Soviets more incentive to change from within, because they cannot move with impunity simply because of their military strength.

**Shulman.** Paul, are you mainly implying by your question that we ought to be prepared for the possible breakdown of the Soviet system?

**Doty.** Yes, because with that would come a quite new element of danger. If collapse should happen, the resulting uncertainty and instability would put us in a period of greater danger.

**Shulman.** On this issue I don't think there is a great deal of disagreement. Some of you are old enough to remember the great American philosopher Mr. Dooley, who said: "It ain't the things you don't know that hurt you, it's the things you do know that ain't so." And part of the problem here is that we really don't know enough about the internal workings of the Soviet political system. A lot of our views are based upon conjecture and speculation, but not always labeled as such. It is true, as

Dick Pipes says, that even among many of the dissidents in the Soviet Union — those who haven't either been put in camps or expelled from the country — you don't find many revolutionaries, because they fear that the alternative to the present system would be worse, that it would be a kind of fascism. There is, particularly in the Great Russian part of the Soviet Union, a very strong Russian nationalism which is xenophobic, anti-intellectual, anti-Semitic, and in its vulgar forms very much opposed to foreign contact and devoted to the old Slavic mission. And most of the intellectuals in the country fear that if that faction were to become the ascendant force in the country, what you'd have would be a kind of fascism. As a result, even the dissidents who don't identify themselves with the system are for reform rather than revolutionary thrust.

But how stable this system is, how likely it is to survive, is very hard to tell. The writers who work on such problems as the minority nationalities — the Uzbeks, the Baltic peoples or the Tadjiks — differ on whether to call it a crisis or a problem. That is, whether these problems are within the limits of manageability, whether the Soviet system can muddle along with it, or whether these will be the Soviet Achilles heel, we really don't know.

Paul's question raises a larger issue: the combination of incentives and disincentives we use to influence Soviet behavior. Clearly, if the Soviet Union faces a crisis — such as Libya getting involved in a fight with the Sudan — we would like to have a combination of incentives and disincentives to bring to bear to dissuade aggressive behavior. But what kind of incentives and disincentives?

The disincentives are partly the military force and the costs. The incentives partly raise questions such as to what extent we want to be involved in economic relations with the Soviet Union, so that they have something to lose if they transgress what we regard as norms of behavior. And that raises very tough problems of substitutability — the question of when goods involved in the international transfers strengthen the Soviet Union to become a more formidable adversary more than they give interest to groups in the society to behave with restraint and responsibility. That's an issue that's not on our agenda, and I don't intend to go into it; nor is it very much debated in the country very effectively, but it ought to be.

**Brown.** I do not believe that Senator Moynihan's problem, the dilemma he presented, will be faced by the current administration or perhaps its

follow-ons. In our daily collection of intelligence, we see many of the internal problems the Soviets are facing. I leave it to the experts to predict when events will occur. The Soviets seem to be able to accommodate at each crisis, but they have not yet had to face a crisis that we have imposed upon them, such as the denial of grain. They have been able to face each crisis and prevail in terms of control of the Party. I think this administration and the next will have to face the problem of Soviet activity elsewhere in the world, such as their support of Libya, Libya into Chad, Chad into Sudan, the developments in Egypt, Ethiopia, Nicaragua, El Salvador, and perhaps Guatemala, and of course Afghanistan. Those kinds of things help to keep the focus off some other internal problems. So between the two, I would be much more competent in predicting what the Soviets would be doing in the near term in forcing the problem upon us, rather than in the more distant term, in solving their own problems internally.

**Doty.** Does any panel member have a question to ask of any other member of the panel?

**Pipes.** Marshall, I think you misunderstood me. I very deliberately did not say that American liberals have illusions about the Soviet Union: I said they are condescending to the Soviet Union. That is a very different thing. I find among American liberals very few who have any sympathy for the Soviet system, but many who love to scorn it and who think it can present no danger to us. In your own remarks there was an echo of that — we have this enormous technological lead and so on. You will not find this as you move toward the more conservative end of the political spectrum: here you'll find a very healthy respect for Russians. The divisions in this country are not between people who are pro-Soviet or sympathetic toward the Soviet Union and those who are hostile to it — I have found no one at any meeting I have attended who is sympathetic to the Soviet Union. Rather, the divisions are between those who believe the Soviet Union represents a real danger because of its capabilities, and those who tend to minimize its capabilities. Behind this minimizing of capabilities lies, I think, a certain condescension toward people who, after all, really are ex-peasants, and you know, how can they ever stand up to us, how can they ever present us with any real dangers? I'm not saying you personally hold these views, but these views underpin a great deal of the liberal outlook.

**Shulman.** Well, I've had it worse. The issue and our friendship will survive this exchange, I'm sure.

But the issue is really not so much whether you're condescending or not — I suppose I am condescending in a way because I am always enormously relieved when I leave the Soviet Union. I feel suffocated there. You know they say that the first thing Soviet specialists do is kiss the soil of any other land they arrive at when they leave the Soviet Union, and the second thing they do is plan how to get back into the Soviet Union to study it some more.

But the real question is whether there is an underestimation of danger, that's the operative part of Dick's question. And my feeling is — I put the question differently — it's a question of seeing the danger accurately. What I'm worried about is that we may not sufficiently understand the direction from which the danger comes. No one would say the Soviet Union is not a danger or a problem to us, but it comes down to such questions as, first of all, whether it is true, as has been said by political leaders, that the Soviet Union is the cause of all our problems in the Third World. If you believe that, it leads to a certain course of action; if you have doubts about it, it leads to other actions.

Take the "window of vulnerability" argument. It's a question of judgment, whether you think it is a plausible scenario that the Soviets take out our fixed-site land-based missiles and sit back to find us impaled on the dilemma of having only a countervalue instead of a counterforce capability. Is that a real problem or not? Is it a serious problem? It depends in part on how you think the Soviet leaders estimate their capability to get away with that without precipitating a general nuclear war. And that's where I think the significant differences are. That breakdown may not be a liberal/conservative breakdown. It may be a matter of judgment, and it's one that ought to be examined. It isn't much examined. Part of our problem is that a lot of widely accepted truths in our current political climate are spread by contagion without sufficient examination.

**Rowny.** I'd like to answer a question that was asked earlier. I think the question was, "How do the Soviets look at our failure to fund various technological innovations?" I think they look upon it with a great deal of glee, and I think they would like to see some of the difficulties exploited. I think it goes right to the heart of much of what you are doing in this conference. Out there in the rest of the country, people are thinking about the MX and the Trident and all the other parts of that five-point program; very few are thinking about C<sup>3</sup>. Over a number of years I've watched various



administrations allocate money to C<sup>3</sup>, only to later see, for one reason or another, that support deteriorate. I hope that doesn't happen this time, because the argument that building up only makes war more and more likely isn't the answer. It's only part of the answer. Yes, it does increase our ability to wage war, and therefore should be a deterrent. But it also increases our ability to prevent a war — to know what's happening, to be able to control our various forces. So I hope that for once we will look at all sides of this very important part of the problem to see what arguments we can use to keep C<sup>3</sup> in our overall financial program. Because if history is any guide, if we have learned any lesson from the past, it is that too many times we've tried to improve C<sup>3</sup>I only to find it whittled away. I hope that doesn't happen this time.

**Question.** You won't have time, I'm afraid, to answer this one. It's a corollary, Dr. Doty, of the question you raised, a little naively and idealistically put, perhaps. What are the prospects for a viable and stable *modus vivendi* between the United States and the Soviet Union, say in the year 2000, if we are able to keep a lid on accidents, if we are somewhat able to right the strategic balance, if we are sensitive — as you put it, Marshall — to the incentive/disincentive syndrome, and if, in Ed Rowny's area, we pursue with some sophistication the negotiation process with the Soviet Union? I ask this because for about 35 years I have destroyed my stomach, most certainly my liver, by living and drinking with the Soviet military for protracted periods, and have found among them on occasion an individual who gives me some hope. I realize that he is only an individual, but at the same time I'm looking at what the bottom line is and what we're talking about. Is there a viable goal out ahead if we can do these things? I'd be particularly interested in Marshall's and Dick's responses.

**Shulman.** Who was it that said, "I regret that I have but one life to give my country?" Sam's version would be, "I regret that I have but one liver to give my country." It's true that this trade is hard on the liver, because sometimes the truth only comes out after you kill a couple of bottles of vodka.

I don't know the answer to the question Sam raises, whether it is going to be possible to manage the competition in such a way that we can walk our way through the minefield of conflicts that lies before us, that could set off a conflict that nobody wants. It doesn't take much imagination to visualize the two countries locked into a situation that is out of control, that nobody wants, where our inter-

ests are in conflict, where we may have a problem managing the level of violence involved. I'm just not sure whether we have it in us, or whether the Soviets have it in them, to manage a competition as intense and as tough as this competition without getting us all into trouble. It would require a lot of restraint and confidence on both sides. It requires a confident leadership, one that is strong enough to manage the competition without having to show hair on the chest. That will be a problem for the Soviet Union when they go through a leadership change, before the new leadership has had time in office to consolidate its power.

It's going to take, also, a lot of maturity on our part to keep in mind that even though this is a tough competitive relationship, we must manage it rather than beat the hell out of them. I think, if someone wants to define maturity, it's the ability to carry around in your head two or more ideas at the same time. That's the kind of maturity we are required to have. And I don't know whether we've got it. The political climate is not favorable to it. Like most industrial nations of the world today, we are in a period of resurgence, of nationalism, and it is a period that has its own particular aspects because of our recent history. But it's very tough to talk about this problem in a measured way and without being misunderstood. I don't know, Sam. The kind of reason and balance you have brought to bear, where you have no illusions whatsoever about the Soviets and their military strength and yet you try to manage that sensibly, is unfortunately all too rare.

**Pipes.** Yes, I'm optimistic. I think it can be done if certain conditions are met. First of all, if we do not tempt them with weakness and lack of resolution, and if we give them rewards for better behavior, I think we could inhibit them from expanding. Secondly, we must not rush all around the world getting ourselves involved in peripheral ventures. Rather, I'm quite tempted to let the Russians get involved in these ventures while we watch from our continental island. And thirdly, not so dependent on us, we might benefit from the kind of change that I alluded to before, which has occurred throughout Russian history, when a period of expansionism has run its course at great expense to internal security, and the Russian state begins to recoil and turn inward. That is bound to happen eventually if the expansionist drive runs into difficulty, and Russia begins once again, as it did in the middle of the 19th century, to turn inward to reform the system. If their system is reformed — and

the reforms are sufficiently far-reaching — then there is no reason why we cannot have a very amicable relationship.

These are a lot of ifs, of course, but I think they are dependent on us, not decisively, but to a very large extent. The worst policy one can pursue to ensure this objective is that which has been pursued by the people who propounded the detente policy, which is to give the Soviets things free of

charge and let them run all over Africa and the rest of the Third World in the hope they will settle down. That should not be done, because it tempts them, and that has accounted for the enormous arms buildup and for the expansionism. You must conduct the very opposite policy. Raise the risks, and induce them to turn their attention from outward expansion to internal reform. That, I think, is the best hope for us.

## **Session II**

### **Perspectives on Weapons Systems**

**Lt. Gen. Robert T. Herres, USAF**

**Commander, Eighth Air Force, Strategic Air Command**

**I** am pleased and honored to be able to substitute for my boss today, representing Strategic Air Command and leading this panel. General Davis wanted to be here, but his schedule dictated that I pinch-hit for him.

Session I has set the stage for this session. Clearly, the factors involved in the development of strategic nuclear policy must be considered virtually a priori knowledge if there is to be meaningful discussion of weapon systems configurations. Such knowledge helps one to understand how complex the problems and issues can be when we try to provide a credible nuclear deterrent force for our nation's defense in today's world.

The first thought that should come to mind when we talk about weapons systems is the Triad. The Triad is that three-legged combination of the manned bomber, the land-based ICBM and the submarine-launched ballistic missile; it was conceived and configured to maximize the credibility of our nuclear strike capability. (Credibility is the key word.) In so doing, it maximizes its effectiveness as a deterrent and confounds the planning efforts of any potential adversaries.

All systems ever built by man have vulnerabilities. Those which do not when first built develop them soon enough. The Triad approach is based on the idea that no two legs should be vulnerable to the same type of neutralizing technique or capability or system. Putting it another way, each leg must offer unique offensive characteristics to complement the forces of the other two. All three legs of the Triad are undergoing, or are about to undergo, extensive modernization efforts. The debate surrounding the MX basing issues has been well

publicized. As for the modernization of the other two Triad legs, the B-1 and the Trident, both programs are well known, talked about a great deal and well understood as complex activities.

On our panel this afternoon we have four of the most prominent people taking part in these programs. They are all deeply involved in some aspect of the modernization process. We are most fortunate to have this opportunity to hear them, and to view this very vital modernization process from their perspectives.

## **Lt. Gen. Lawrence A. Skantze, USAF**

**Commander,  
Aeronautical Systems Division (ASD)  
Air Force Systems Command**

I will give you a short chronology of the "bomber perspective" from an Aeronautical Systems Division acquisition point of view. In January '77 the Air Force had a force structure for the future with which it felt comfortable. We had budgeted for 244 B-1 bombers. Numbers 5, 6 and 7, the first production airplanes, had been released and were on contract. In 1981 — this year — we would have had the initial operational capability. And by the mid-80s we would have had a capability to deliver roughly five thousand weapons. The cruise missile had just moved into joint office status, and in all candor it was sort of a relaxed program from the Air Force point of view. The MX was just stirring in its definition phase.

By the end of June '77 we were in shock. The President had decided that we would not produce the B-1, but instead would produce the cruise missile. That would be the new weapon system for the

bomber force, being cheaper, more easily proliferated, more cost-effective, and it represented existing technology that we could exploit. I might point out that when Harold Brown participated in that announcement, he stated that the B-1 development program had been successful, that it had met its objectives and that the B1 would have been a successful weapon system in his judgment — except that there was a more cost-effective solution.

By the fall of '77 we had worked out an agreement with the Joint Cruise Missile Program Office, which had the responsibility for taking the cruise missile through competition, with our responsibility being the basing of a weapon system on the B-52. We were committed by Secretary Brown and Dr. Perry to meet a first-alert capability at Griffiss Air Force Base in September 1981 and an IOC of December 1982. We met the first commitment and plan to meet the second. We delivered our first

airplane, 12 missiles, plus the support equipment, plus the trained crews. So although that was a fast track, we did meet it.

The other issue in the fall of '77 was where to go with the B-1 development program. We had flown numbers 1, 2, and 3; number 4 was just coming. But number 4 had the full defensive system developed by AIL as the ALQ-161. We thought it extremely important to test fly that airplane to find out if that defensive system, tailored to the B-1, would indeed provide the capability we had expected. It was very difficult to get that program going, because the B-1 program had been canceled — the sharks gathered, all the funds began to disappear. But fortunately we were able to obtain the funds to continue the flight test program and get data that I consider vital to any future decision on the bomber.

We then had a hiatus. The "Let's restudy the bomber" syndrome resurfaced. In 1980 Secretary Mark directed that the Scientific Advisory Board, chaired by Dr. Getting and Norm Morgenstein, put together a special study group to look again at the bomber and the bomber options, specifically the stretch FB-111, or the B-1 or B-1 derivative, and a new technology — generic bomber. That process took place in the first six months of 1980, and was subsequently reported to the Air Force and USDR&E.

That summer an amendment was sponsored by Senator Glenn that, in effect said, "You will start development of a new bomber" and was voted into the FY authorization bill. For the \$300 million authorized, we were directed to look at the B-1 or B-1 derivatives, the stretch FB-111 or an advanced technology bomber, and report to Congress on 15 March 1981. Immediately an OSD bomber study group was formed under Si Zeiberg, and shortly thereafter the Air Force began to formulate its recommendations for a program. Needless to say, we at ASD were totally, heavily and very consequentially involved in all of this process — the definition phase, configuration, costing, schedule, and all aspects.

The bottom line was the formulation proposed to USDR&E and OSD by the Air Force and subsequently accepted: the B-1 bomber program of one hundred aircraft followed by an Advanced Technology Bomber (ATB). It is vitally important that that decision be seen in its true perspective. It is a bomber program designed to meet immediate needs but which leaves the door open for what we can bring along later, with a balance between the two. The program was within our fiscal ability.

This position was long considered, and long and intensely debated, particularly once the Air Force had formulated it.

So, in Winter 1981, we went through the decision process. A very complex set of conditions and issues had to be addressed. The process had to be gone through even by those of us who had spent a couple of years on the program and felt we had worked through the answers. The decision did not come in March, 1981. As you know, it was October, just this month, before the President made his decision.

From an acquisition point of view we've got a good solid baseline; we've got a good cost estimate; we know how to contract for the program, we know how to manage it. But it needs support, and it needs stability. Yet we are moving into an era of uncertainty. Out in Dayton, where our country folks are, we read in the Washington papers things like "dead horse," "what's buried ought to be left buried," "used car," "what a turkey." The battle to articulate the B-1B program is only now beginning in earnest. We have had representatives from the House Surveys and Investigating Committee and the GAO out in the field, very properly making sure they understand how the cost estimates were built up and how the configuration was arrived at — but at the same time looking for what we left out. We left out things that this or that person might want, but which we cannot afford.

We are going to have considerable exchange in the Congressional arena on this program, and the argument will tend to turn on what the B-1 is not, as opposed to what it is.

I have a sense of "deja vu." I remember when I took over the AWACS program in 1973. Then too a new administration had come in, and they felt that AWACS could and should be better — and rightly so; but we had a baseline and were trying to proceed to a production decision. It took us a long time to explain to the administration that there was a two-year delay inherent in trying to change that baseline to add in all the new things they wanted. The net result was that we were accused of having an ineffective system. The GAO came down on us very heavily, and we made it only by the skin of our teeth after great debates in both the Senate and House Armed Services Committees. But the upgrades did come through, and we programmed them in such a way that those capabilities are coming in now.

I dwell on the AWACS program because you'll notice that part of the rhetoric now coming out is,

"We can't afford two bombers. We've got this B-1, but if we spend our money on that we won't get the ATB." But I suggest this to you. I don't disagree with the premise that tomorrow's systems should be better than today's — that's always been true. But there is a corollary that says, "In our business, better is the enemy of the good." That's one of the issues that is going to be debated. I repeat: the structure of those two programs was not lightly arrived at — not without great consideration on the part of Dr. DeLauer, the Secretary of Defense and the President. There is a structure in how we put that program together, and there is a management rationale for it.

I would like to briefly describe the B-1B. It will be a highly effective system, in my judgment. We're putting a new radar in it, an F-16 derivative. It will have a cruise missile carriage, and its radar cross section will be an order of magnitude smaller than the B-1A. We know how to do those things. It will have an upgraded version of the ALQ-161 defensive system. I would like to assure all of you that we have run this configuration through a considerable amount of penetrativity analysis. The results convinced us that the B-1B will be an effective penetrator in its new configuration for some time to come.

Let me digress for just a moment here to make what I think is a relevant point. You may remember an operation in Southeast Asia called Linebacker II. When that exercise was run in North Vietnam in '72, some characterized it as a flagrant abuse of people — ineffective, callous, unthinking. When General Meyer, then CINCSAC, was briefed on what losses to expect, estimates ranged anywhere from 20 to 30 percent of the force. As all of you know, those operations went on for several days and only a few bombers were lost. They went on to the point where they had exhausted the supply of SAMs in North Vietnam, and each day the tactics got a little better, the crews learned, the ECM cell structure got better. We found out that when you apply a strategic force in the way it's intended, it works pretty damned well. And we think the B-1B is going to be that kind of aircraft,

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and is going to fulfill the vital need in the near term.

The problem is sustaining the program, and sustaining the proposal. We have two-year Congresses and four-year Presidents, but ten-year programs.

The bomber business is difficult; we're faced with an attitude that's lasted 20 years — that bombers have gone the way of battleships. Khrushchev too made that analogy — but then the Soviets went on to build the Backfire. At any rate, we will have a difficult problem ahead trying to convince the Congress that this program is vital. It's interesting that the people who will assert that the B-1B is not going to be effective will probably also say that the B-52 will last into the

next century, and isn't it a swell airplane.

The B-52 has indeed had a long life. This is a tribute to its versatility and flexibility. I suggest that it is also a tribute to our inability to successfully advocate a new bomber. We must advocate the B-1B program in a clear, factual manner, because it is essential.

I believe that the B-1B will be an effective and versatile weapon system. But we have to stand behind it and not let it be nitpicked to death. We have got to create a meaningful dialogue on this program.

**Fowler.** The whole program seems to be focused on 100 airplanes. Historically that is an inefficient buy. Also there are all kinds of purposes for an airplane of that size. I trust there's at least some thinking — maybe I should address this to Dick DeLauer — about going beyond the hundred to get further down on the learning curve.

**Skantze.** We are not wedded, in the final analysis, one way or another. A couple of years from now we may want to review the bidding and look at the force structure again.

**Question.** Could you give us an idea what you envision as the role of the B-52s once the B-1 comes in? Will we automatically phase them out, or are we going to beef them up?

**Skantze.** There is a phaseout plan, and it begins with the D model. I think that ultimately, as the

other elements of the force structure come along — including the MX — that we'll phase out the Gs, and take the Hs out of the penetrator role and make them cruise missile carriers. It is a balanced approach, and it does include a deliberate process of phasing out the B-52s later on.

**Question.** Over what period will that 100-plane buy take place?

**Skantze.** If we can get a quick go ahead, we would expect the first 15 B-1 bombers to have an IOC in late '86, and the balance will probably come in by '89. We plan to build three a month.

**Question.** Does the B-1 introduce any special command and control requirements?

**Skantze.** I do not envision any over and above those that SAC uses to control the B-52 force. Bob, are you aware of any?

**Herres.** Well, there will hopefully be features on the B-1 that we don't yet have on our B-52s. Obviously we would like to have EHF receivers, communications satellite connectivity, and ELF/LF, if we can figure out a way to get it on there — I'm not sure it's going to be that easy, but some say it can be done. So, really, the same things we want for our B-52G and H models are what we want for the B-1. If I read your question right — "would there be anything different?" — I don't know of anything we would want on the B-1 that would be different from what we want on the B-52 G and H models; it's all the same problem. I would say this: the need for better communications becomes more important after the B-1 becomes an ALCM carrier, because we gain a lot of flexibility by having better communications with that ALCM carrier.

**Question.** General Skantze, one of the most successful weapon systems we've ever fielded is a SRAM. Is there any intention to capitalize further on this technology, and perhaps later on have a super SRAM connected with a B-1B, or even with an ATB?

**Skantze.** At the moment the intent is to utilize the current weapons inventory plus the additional buy of cruise missiles. We are in the process of completing the qualification of the improved SRAM rocket motor and that will go on a standby basis. But at the moment there are no plans for additional SRAM buys, though I would not rule out the possibility. One of the contenders to counter a Soviet Union Airborne Warning and Control System (SUAWACS) would be some kind of upgraded SRAM; but we are studying alternatives, lethal and nonlethal, as opposed to committing ourselves one way or another at this point.

**Question.** One of the problems with our current bomber force is its vulnerability to electromagnetic pulses in a nuclear environment. Do you envision that EMP problems will be treated in the design of the B-1? Do you feel that we have a high enough level of EMP testing and technology to do that?

**Skantze.** The original B-1 bomber had a very highly EMP-resistant design; that same design will be maintained.

**Question continued.** Do you feel that we have a high enough confidence in the available data to design high confidence pictures of the aircraft?

**Skantze.** I think we've increased our confidence. We've had the B-52, the E-4, and the KC-135 on the EMP testing trestle. I think we will move ahead with additional EMP hardening for the B-52. The weapons chains for the SRAM and the cruise missile are both hardened, but it would get out the hardening of the other susceptible elements of it. That funding is in the new program.

**Herres.** I'm sure if there were any way to do more than is being done without doing atmospheric testing, the guys involved would like to know about it, because it's sure been worked hard.



## **Maj. Gen. Forrest S. McCartney, USAF**

**Commander, Ballistic Missile Office**

**H**erres. The next speaker is Major General Forrest S. McCartney, Commander of the Ballistic Missile Office of Air Force Systems Command at Norton. He is responsible for the research, design, development and acquisition of ICBMs for the DOD, including, of course, the MX. The Minuteman improvements and the advanced ballistic reentry system are among the other programs he looks after.

**McCartney.** In the remarks I had prepared, I had hoped to point out that I'm not sure the decision makers clearly understood what they were doing when they developed the Triad, but it has sure served our nation well for many years. I think it will continue to serve us well.

I was also going to point out that ICBMs are recognized nationally and internationally as a very

substantial part of our peacemaking force, for several reasons. Among those are their reliability, their low operating cost, their accuracy and their response timelines.

If you will recall, when we first got into the ICBM business, countdowns were a matter of a few tens of minutes. As we have progressed into solid propulsion systems, they are now a few seconds. Our accuracies were good, but they have improved significantly, and I foresee that trend continuing in the future.

Another area deserves reflection: retargeting timelines. The Atlas had a guidance system that was a long and laborious effort to reprogram. Titan I had a target system installed in the computer. Minuteman I, I believe, had a couple of target sets. In those days, the C<sup>3</sup> systems were primarily those required to support a launch against a primary or

alternate target. Minuteman II had a larger set of targets that could be selected. Now, of course, Minuteman III has a much larger set. It also has the ability to retarget itself in a matter of a few tens of minutes.

An additional requirement has thus been imposed on the C<sup>3</sup> systems that support these missiles: to be responsive to our national policy regarding flexible response. This trend will certainly continue.

The MX system will have an even more flexible retargeting capability. So that decision makers can exploit the inherent characteristics of the ICBM force, we need viable, enduring, survivable C<sup>3</sup> to communicate with the MX.

Another reason we need good C<sup>3</sup> for the ICBMs is to improve endurance. Up to this point we have been able to obtain survivability using hardened silos. I'll speak in a moment about future trends, but certainly technology can give us much better endurance than ever before. For example, the new batteries will permit us to last a much longer time than did conventional batteries.

With the advanced guidance systems we can power these systems down; they can lie dormant for extended storage periods and then be brought up to a high state of readiness without significant degradation in their accuracy. Even more advanced technologies in guidance systems — ring laser gyros, for example — will allow us to make use of dormant storage periods, if that is in our national interest. But it does us no good to have those systems available if the decision makers — the National Command Authorities — do not have the ability to communicate with the missiles and launch them.

About the MX basing decision: the President has said that we will put the MX in silos in the immediate future, and that we will look forward to a decision in '84 or so on some alternate basing techniques or modes. Alternatives include a continuous patrol aircraft, the ABM point defense, and, of course, deep underground basing.

I think these alternatives illustrate a continued emphasis on survivability. This puts a continuing burden on the C<sup>3</sup> systems to support the ICBM weapon systems in a very viable, long-enduring, survivable way.

With all of the recent discussion about basing, I wanted to talk to you about something that very few people ask about these days: the missile. The missile is doing very well. We have been working

diligently on it. As you know, it's about a 200,000-pound missile, about 70 feet long, about 92 inches in diameter, and it will fit in either Minuteman or Titan silos, as well as in other structures such as the MPS systems the President rejected. It has three solid stages and one liquid stage. We are now a little over two years into full-scale engineering development on that system. People don't, I think, really appreciate that the program is about \$2,500,000,000 downstream at this time. And I could not be better pleased with the progress we've made.

I'd like to briefly describe the missile from top to bottom. The design of the shroud that covers the reentry vehicles is pretty sound and about what we want. We have already accepted some three or four of them. Locally, the Avco Company is working on this, and I believe Grumman is the manufacturer.

The reentry system is ready for us. It will be graphite epoxy — at one time we were thinking about an aluminum structure. I think we have two or three of them at this point. They've passed their flexibility tests to see if they're stiff enough, and the reentry part of the program is moving splendidly.

The fourth stage, made by Rocketdyne, has been fired some five or six times on a workhorse-type of configuration with its full plumbing, valves, manifolds; and the performance of this system has been satisfactory. We have taken the first engineering prototype and within a matter of weeks we will be firing it to demonstrate its performance. To date, it is as good or better than we had anticipated.

A lot of companies are making instruments. Locally, Draper Labs gives us support for the guidance system, Northrop makes the third generation gyros, and Honeywell makes the specific force integrating accelerometers. Northrop out in Los Angeles puts the equipment together.

We've run the inertial measurement unit on the track down at Holloman AFB. I'm pleased to tell you that it understands where it is and where it's going. We've also put it on the centrifuge, spun it up to a couple of times the flight environment we expect to see for about twice the duration that we expect, and the performance of the instruments was just as we anticipated. We are delighted with the performance of the inertial measurement unit (IMU). Autonetics is integrating together the total guidance and control hardware, including the computer system; they've had that breadboard playing, and the IMU is now being integrated with the guid-

ance system down at Autonetics. So the guidance system, which will provide us with increased accuracy, is doing well.

All three of the solid stages have been fired three or more times. The Hercules Company has fired stage three five times — all full-duration firings — full-size, full-thrust. About halfway through one of the firings we experienced some difficulty with a heat problem in one of the exit cones, but its performance was more than satisfactory and the next firing demonstrated that we understood that problem. So we've had four perfect firings and one almost perfect firing of the third stage. Two of the firings of the third stage were at altitude. The second stage most recently completed its third successful firing at sea level. The motor on the second stage is made by Aerojet in Sacramento. We expect to be firing it down at Talahoma very shortly. All three firings we've had to this point have been completely satisfactory.

The first stage made by Thikol in northern Utah also has had three full-scale, full-duration firings.

The system is in a canister being built by Hercules and Westinghouse, the same people who make the launch system for the Navy. A couple of those canisters have been delivered to this point. We've done two or three firings of the gas-generation system, and it performs well; it will be used to expel the missile from the tube. We are now installing it out at the Nevada test site just northwest of Las Vegas, where we will demonstrate the physics late this year or early next year, to understand how the missile will eject from the tube. Those will be full-scale, full-weight firings; we will be pleased to get them out of the way. Right now they look very good to us.

We are beginning to occupy our test facilities out at Vandenberg. Locally, GTE Sylvania will be helping us to do the communications work there. Those facilities are coming along well, and I'm looking forward to seeing our initial flight hardware begin to arrive at Vandenberg next August. We've already developed much of the test and handling equipment that we expect to deploy with this system. We have taken a different approach this time than they did for Minuteman. We are developing that operational equipment from the onset. Martin Marietta has been doing a very good job of that, and Goodyear is one of the major subcontractors. Their handling equipment looks good to us, and we have the transporter that will haul the first, second and third stage. Three of them have already been

delivered, and they have been dispersed to the various areas where they will operate. We believe those transporters will be extremely useful, and will perhaps be the transporters we will use for missile buildup at the silos under the basing scheme the President recently approved.

To sum up, all components of our flight hardware are moving along very well. We are very pleased with their progress at this point. We are scheduled to make our initial launch out of Vandenberg in early 1983. I know of no reason why we can't meet that objective.

**Zraket.** Forrest, what changes, if any, would we have to make in the MX to go to a Big Bird, or deep underground basing, or any of the other basing schemes that people are talking about?

**McCartney.** We don't think there would have to be any significant changes. As a matter of fact, the decision to put the MX into existing silos has not impacted the flight hardware at all. We are in the process of looking over our hardware to see if there are any changes that are obvious to us. Right now there are not. The missile itself is pretty rugged; we might want to make a couple of areas of it more rugged before putting it in an airplane. At one time, as you know, we were asked if we could take the missile to an air basing concept, and the answer is, yes we could. The missile might need to be reexamined structurally, but I don't think we would have to change it. We are just now looking at our test program at Vandenberg to see what changes might be needed there. It appears that the hardware that we intend to fly, for the first five flights at any rate, would not be impacted. The MX is more or less insensitive at this time to the basing mode.

**Question.** What is the IOC if you put the MX in Titan silos? It seems to me that we have an urgent problem, and that both the B-1 and MX are rather far off. Could MX be accelerated with more funding?

**McCartney.** No, I don't think so. When we were planning to deploy this system in mid-1986, it looked like a pretty orderly deployment system to us. In reexamining how to put them in the current silos, the President, or Mr. Weinberger, suggested we do it earlier if possible. We have been looking at alternatives but at this point I do not want to commit to anything earlier. I think '86 deployment is about where we should be, and is about where we will wind up. If you wanted additional concurrence, perhaps you could get it, but our program now leads to an '86 IOC, and that's where we'll

keep it unless we find it possible to speed up. Right now I cannot say with confidence that we could.

**Herres.** You've got to consider an orderly phase-out of the current missile too.

**McCartney.** Yes, sir. I'm sure someone is going to ask where we are going to put the current missile, so I'll answer it before you ask. Those decisions have not yet been made. We're in the process of looking at that. But certainly there must be an orderly phaseout of the missiles now in those silos.

**Scowcroft.** One of the options for basing is deep underground. It appears that if we went that route we'd give up one of the main attributes of the ICBM, which is prompt hard-target kill. Are you looking at a deep underground deployment that would make the missiles immediately available?

**McCartney.** Sir, that will be looked at. It is not obvious to us how to go deep underground and still have prompt response. How deep is deep? How would we base the missile? How long would it take us to get ready to fire the missile? These are complex problems that we must investigate. As a matter of fact, Colonel Berry, my vice commander, was in Washington last week getting thoughts on that. We will be issuing a request for industry to assist us in it. It certainly will be a formidable problem to have adequate C<sup>3</sup> deep underground as well as to have a timely response. I think you will see a significant tradeoff there — trading off response time for survivability.

**Question.** Sir, I don't think that you mentioned the eventual possibility of submarine basing when you were talking about MX basing. Is that an oversight, or does the Air Force just not consider that a realistic possibility?

**McCartney.** No, you're quite correct, I did not mention it. The President asked us to examine the alternate basing modes for the MX, which I mentioned: point ballistic missile defense, deep underground basing, and basing on aircraft. The missile was not designed for deployment on submarines; I think it would be improper at this time to say that

it could be put on submarines. I think the Admiral could address that more readily than I, but I do not think it is compatible with submarines. We were not given that job to look at, and that's why I did not mention it.

**Question.** Is there any reason to believe that if ballistic missile defense is deployed on the U.S. side, the MX could penetrate the likely Soviet ABM system?

**McCartney.** Well, certainly we are aware of the Soviet efforts relating to ballistic missile defense. I would say that we have been successful with countermeasures that permit us to penetrate their defenses. I would not expect that to change in the future.

**Question.** You mentioned the question of

targeting and retargeting, and later we were talking about promptness of response. In the event of a Soviet preemptive strike, would you have time to retarget the missile?

**McCartney.** Assuming that there was a desire to retarget the missile, the point I was trying to make is that technology already allows us to be more flexible in retargeting. The MX will be even more responsive to retargeting. Back in the early days, SAC Headquarters had to take the target tapes to the field, enter the silo, and read them in. Now the people who are operating the system adjust the targets or retarget the system as they are directed to do.

The point I was trying to make is that this trend has certainly imposed an additional burden on the C<sup>3</sup> system. I see the MX continuing, not easing that burden; therefore we need a viable, enduring C<sup>3</sup> system that will permit us to exploit that flexibility. Times for retargeting are short now, and they'll be even shorter in the future. The system will respond to the decision makers, the National Command Authorities, in a way that I think is consistent with our flexible response policy.

**Question.** I just wanted to make sure I understood an answer you gave before. You said that we are going to explore hard point defense with our MX as an option, but you are confident that we

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could penetrate a Soviet hard point defense. Is that correct?

**McCartney.** That's the gist of what we understand. We have designed the system to cope with the threat described to us. I think the system will do what it is intended to do for many years to come.

Regarding the decision to investigate hard point defense for later deployment: an ABM system is the one the Army has been tasked to study. I do not know whether or not the system that the Army will propose in '84 will be acceptable. But MX as now designed will meet the threat as it has been

presented to us. As the threat evolves, I am confident that we will find ways to continue to meet that threat.

**Herres.** A comment on one characteristic of the land-based ICBM: its high day-to-day alert rates. No other leg of the Triad provides, for an indefinite period of time, the capability to put virtually your entire force on alert day in and day out. For that reason, you get more day-to-day capability per dollar with the land-based ICBM than with any other nuclear strategic deterrent capability. And that's very important.

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## **Rear Adm. Stanley G. Catola, USN**

**Trident Systems Project Office,  
Headquarters, Naval Material Command**

**A**s you may gather from my biography, I spent most of my career at sea or in sea-duty-associated tours — in fact, 22 straight years. If you add up 11 strategic deterrent patrols and five more long submerged deployments on attack submarines, it comes out to a little over three years submerged, isolated, sculling around under the ocean. So if I appear flaky to you this morning, you'll understand why.

General Stansberry said this morning that we were bringing in new strategic systems — the MX, the B-1, and others. Trident is one of those other systems.

The Trident System is a complex system consisting of a new large submarine which is being acquired by a project manager in the Naval Sea Systems Command. Its nuclear propulsion plant is under the auspices of Admiral Rickover's Naval Reactors

Organization. Its communications systems are under a project manager in the Naval Electronic Systems Command. The Trident missile and all its associated launch and fire control systems are brought together by the Strategic Systems Project Office, while the bases for dedicated logistics support of Trident are constructed by the Naval Facilities Engineering Command. My project, the Trident System Project, coordinates these disparate groups to ensure that all the elements come together in an effective, integrated weapons system.

The Trident System stems from extensive Department of Defense studies which commenced in 1965 and culminated in the decision to build a survivable, cost-effective submarine missile launching system. In this effort, nine major systems were examined, ranging from the Trident concept to ballistic missiles on surface ships. Within the sub-

Trident I missile was deployed on schedule in October 1979 after the most successful test and evaluation program yet conducted on a submarine-launched ballistic missile. Performance objectives of missile range and payload were met or exceeded.

Figure 4 shows how the Poseidon C-3 missile used up the growth potential of the 31 Lafayette class submarines. For strategic reasons it was decided to size the Trident I missile to fit into these submarines.

Figure 5 provides the available operating areas of submarines carrying Poseidon missiles, to a

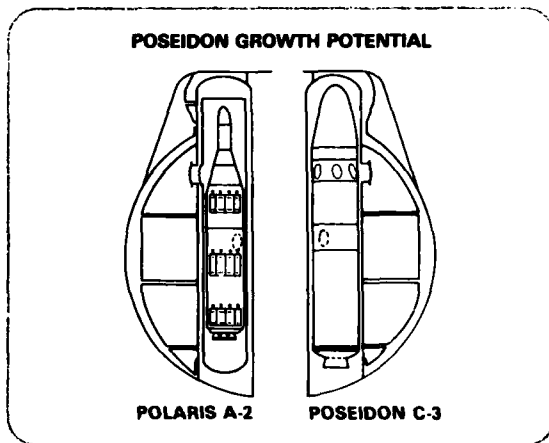


Figure 4



Figure 5

rough order of magnitude of four million square miles. Figure 6 indicates the operating area available with Trident I missiles — 40 million square miles, again to a rough order of magnitude. These operating areas are the maximum available when the missile payload is decreased to allow for greater range. The greatly increased operating

area allowed by the greater range of Trident I gives these SSBNs much greater survivability. It also allows them to be based in the continental United States, eliminating the need to depend on overseas bases. The backfitted SSBNs can cover potential targets immediately upon departure from their base at Kings Bay, Georgia.

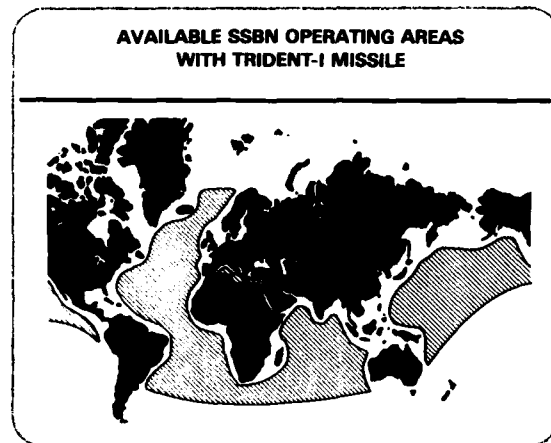


Figure 6

The backfit program encompasses the twelve Poseidon SSBNs converted to C-4 missiles. Six have been converted and are presently deployed out of Kings Bay, Georgia. Six more are undergoing conversion or backfit and will be completed in Fiscal Year '82. Figure 7 shows some of the submarines at Kings Bay. However, these Trident backfitted SSBNs are not a substitute for the modern Trident submarines, which will provide the force of the 1990s and beyond and will have the potential for future missile growth capability. The inability to backfit modern noise-reduction techniques and ship systems into present SSBNs, their lack of

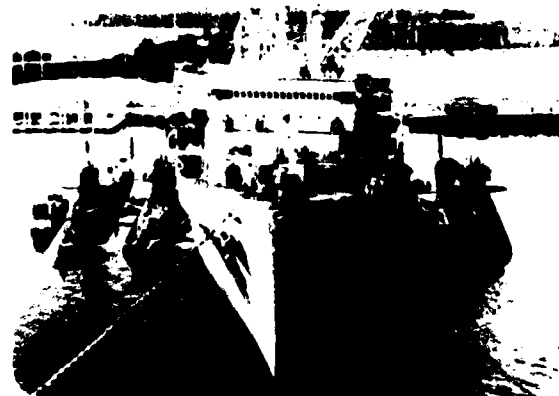


Figure 7





Figure 9

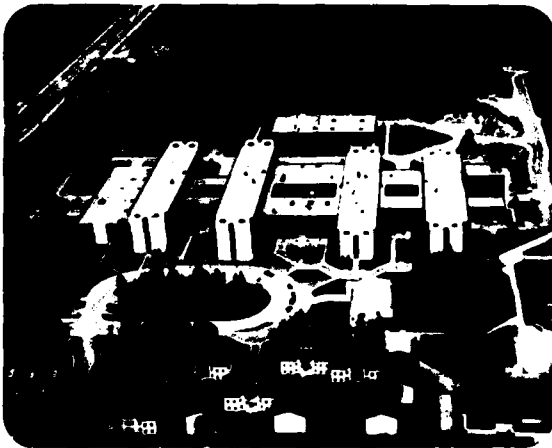


Figure 10

the refit industrial facility, which contains support shops capable of performing all repairs and maintenance necessary to return the ship to sea.

Figure 12 shows the waterfront area at Bangor. In the center is the refit delta, which has two refit piers and a drydock. It is built out away from the shore for environmental reasons — to let the salmon move freely.

The Strategic Weapons Facility, Pacific, provides missile handling, storage, maintenance and assembly for the Trident I missile. Figure 13 shows the missile's motor magazines. Figure 14 shows the explosives handling wharf, which provides missile loading and offloading capability. The submarine actually drives under it. The wharf is shorter than the submarine is, to allow verification from satellites.

To accommodate the projected Trident SSBN force level of at least 15 submarines, additional

basing facilities will be required. National strategic considerations, including the need to have modern SSBNs in both the Atlantic and Pacific theaters to present a two-ocean ASW problem to the Soviets, strongly supported construction of a second

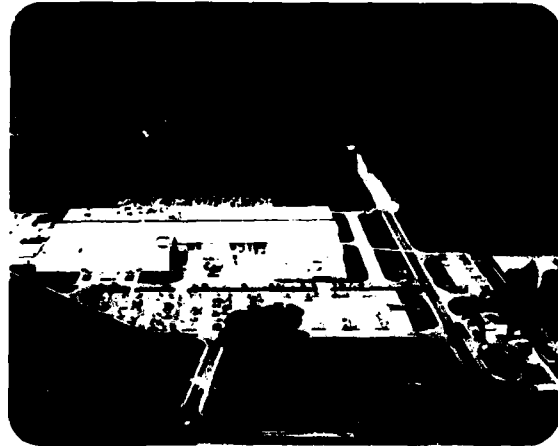


Figure 11

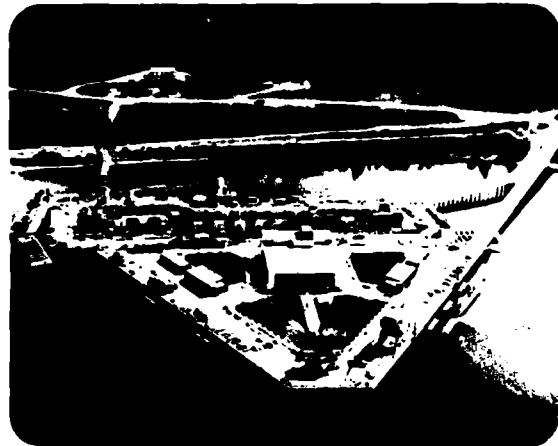


Figure 12



Figure 13

marine ballistic missile program, over one hundred configurations — with variables such as missile tube size and configuration, ship size, speed and defensive capabilities — were examined to arrive at the Trident configuration.

Figure 1 gives an idea of the progression of the Navy's sea-launched ballistic missiles. From Polaris A-1, deployed in November 1960, through A-2 in '62, A-3 in '64 and Poseidon C-3 in '71, each new generation of missile represents a substantial technical improvement. The C-4 missile, deployed on 640-class submarines in 1979, and the D-5 missile which is currently under development, continue in this tradition.

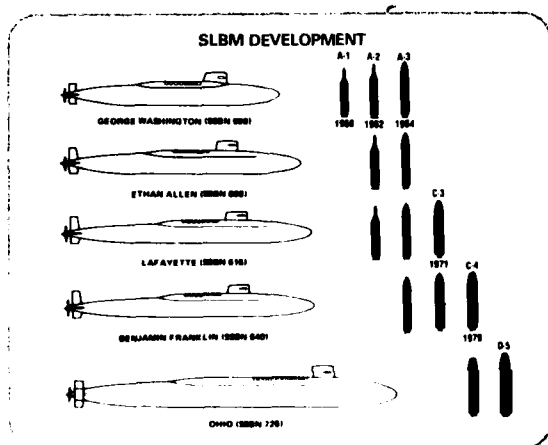


Figure 1

Nominal missile ranges have improved from 1200 nautical miles for A-1 to 2500 nautical miles for C-3. Payload has increased and accuracy has been improved. With Poseidon, our submarine missiles were provided multiple independently targeted reentry vehicles (MIRVs), representing a great increase in flexibility. Each class of submarine has been sized to allow room for missile growth.

The Trident I, or C-4 missile, is the next generation after the Poseidon C-3. The C-4 missile, with a nominal range of 4,000 nautical miles, achieves the same accuracy as Poseidon at 2500 nautical miles. The size of C-4 was constrained to allow it to be backfitted into Poseidon submarines, so its dimensions are the same as the Poseidon C-3. Increased range was made possible by advances in propulsion, microelectronics and weight-saving materials. The missile has a new three-stage, solid-propellant configuration with a maneuverable equipment section. One notable difference

from the Poseidon design is the introduction of a solid-propellant third-stage booster mounted in the center of the equipment section. Each of the three stages has a boost rocket motor with advanced propellants, improved case materials, and a single lightweight movable nozzle with a thrust vector control system. Boost velocity control is achieved by burning all boost propulsion stages to burnout and shaping the trajectory to use all the energy without thrust termination. This method is termed "generalized energy management steering."

The equipment section is powered by a solid-propellant post-boost control system. To improve the missile's aerodynamic performance, an extendable aerospike is included to overcome the high drag produced by the blunt C-4 nose fairing.

Figure 2 shows a flat-pad launch test of the C-4 missile. Figure 3 is a performance evaluation missile launched from a submerged submarine. The

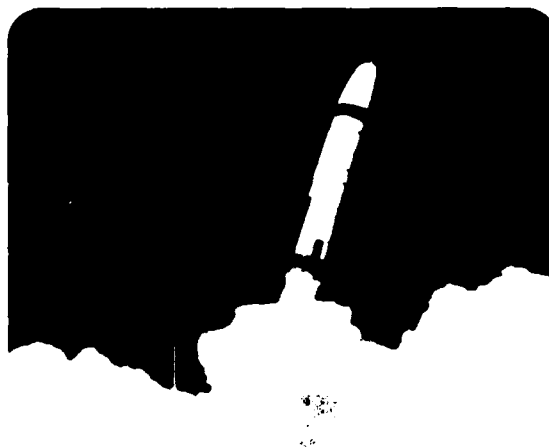


Figure 2

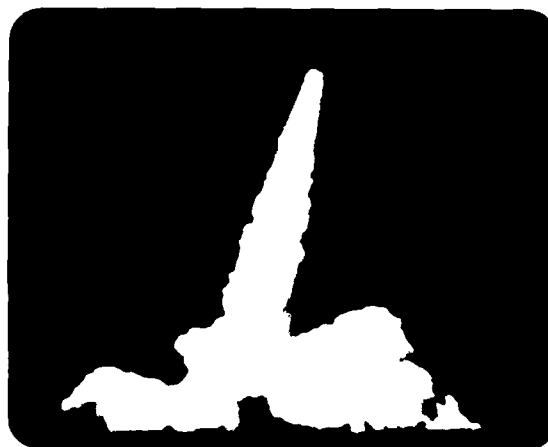


Figure 3

growth room for future improvements, and their increasing age all place limits on their future capabilities.

Figure 8 illustrates the need for Trident submarines that will come with the reduction of submarine-launched ballistic missile launch tubes in the mid-1990s, as the Poseidon submarines retire at the end of their presently planned extended service life of 30 years.

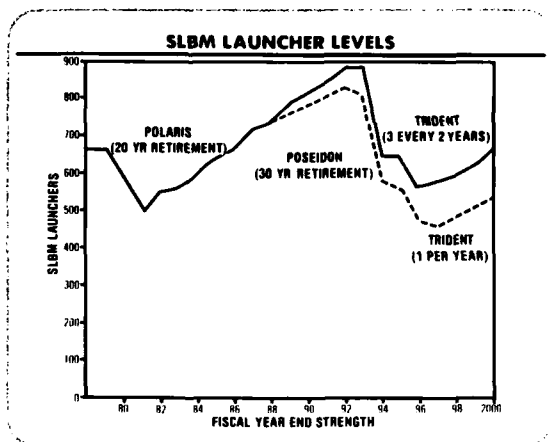


Figure 8

The Trident submarine design evolved from numerous studies. The objective was to design a cost-effective strategic launch platform that would be survivable well into the future. Survivability is maximized when the SSBNs are at sea and submerged; therefore Trident was planned to have a shorter refit period than earlier SSBNs and a nine-year interval between overhauls, the overhaul period itself being reduced to twelve months. These economies result in a 66% at-sea availability over the lifetime of the Trident submarine — a significant increase over the availability of our current force, which is 55%. This great improvement in at-sea operational time, made possible by unique Trident-integrated logistics support and modular equipment replacement concepts, further enhances the credibility of the submarine-launched ballistic missile deterrent by maximizing the time the force is at sea, submerged and survivable.

The Trident submarine was designed based on all the survivability and capability requirements of a sea-based deterrent system. The power plant will provide the speed required to invade enemy ASW platforms in broad areas of the ocean. Trident submarine design allows higher patrol speeds and less radiated noise, ensuring secure patrol

operations over larger areas of the ocean and greater capability for threat avoidance.

Twenty-four missile tubes are installed on the Trident, compared to 16 on Poseidon submarines. The ship design allows room for growth in the missile tubes for follow-on missiles such as Trident II or the D-5 missile with capability for improved accuracy, greater payload and greater range. Sufficient volume is available for extensive noise-quieting measures. Growth room is provided for the ship's systems so that future improvements affecting survivability and effectiveness over Trident's 30-year design life can be incorporated. The ship is designed for rapid removal of equipments, and space is available for free movement of equipments to the logistics hatches where the equipment can be removed and replaced. The logistics hatches themselves are six feet in diameter, compared to all previous submarine hatches, which were on the order of 25 inches in diameter. All of these features will lead to decreased in-port time needed for normal maintenance or repairs.

The first Trident submarine, OHIO, is expected to be delivered to the Navy in October 81. After predeployment operations she will deploy in late '82.

The third major feature of the Trident system, in addition to the submarine and the missile, is the Trident logistics support system. The principal component of this system is the new submarine base at Bangor, Washington, built specifically to support the first Trident submarine squadron. Having shore support facilities concentrated in an integrated, dedicated site has many advantages. Crucial transit time is saved for the submarine, making it possible to meet the stringent operational goals of Trident. Furthermore, when the Trident returns from patrol the crew is already home, since their families are in Bangor. Therefore both crews are available to conduct the refit and preparation for the next patrol. This permits a shorter refit period and improves communications between the two crews.

There are four major Trident support commands at Bangor. Submarine Base Bangor provides host command support. Figure 9 shows the core area of the submarine base, with administrative and personnel support facilities. The Trident training facility, which provides initial replacement and advanced training for Trident system personnel, is shown in Figure 10. The Trident refit facility provides intermediate-level maintenance and replenishment of Trident submarines. Figure 11 shows

Trident base on the east coast of the United States. After completion of extensive strategic and environmental studies, Kings Bay, Georgia was selected as the location of the Trident Atlantic coast strategic submarine base. Planning and design work for Kings Bay is underway. Figure 15 shows part of the area where the base will be built.

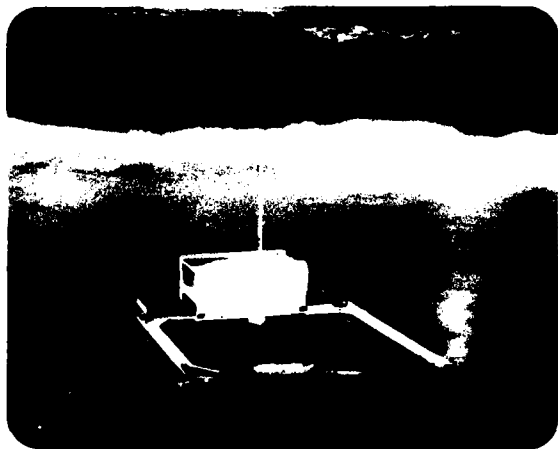


Figure 14



Figure 15

As I mentioned earlier, the missile tubes of the new Trident submarines are designed larger than required by the Trident I missile. This takes advantage of expected advances in missile technology and provides growth room for follow-on missiles with greater capability which we expect to be developed over the 30-year life of the submarine. An advanced development program for the Trident II follow-on missile was started last year. Its improved accuracy and payload characteristics will optimize the effectiveness of the Trident fleet in support of future national deterrent objectives, and will provide the submarine leg of the Triad

with capability against a wide spectrum of Soviet targets.

The President has announced that the D-5 missile will be developed, with an initial operational capability in 1989. An ongoing improved accuracy program, to be completed this year, is providing a vital input to the advanced development effort. With completion of the improved accuracy program we will have a better understanding of the error sources, and of the technology necessary to achieve the higher accuracies desired in our next-generation missile.

By its very nature, the Trident force will act as a stabilizing influence during times of worldwide crisis. The continuing existence of a survivable at-sea ballistic missile force will decrease incentives for large-scale attacks on the United States since such attacks would not affect our ability to retaliate with submarine-launched ballistic missiles. The Trident incorporates the latest technology. It is designed to counter postulated threats. It will operate in large areas of the world's oceans where it cannot be effectively targeted. Trident is therefore essentially invulnerable to preemptive attack. This inherent survivability provides our nation with a secure reserve force which can threaten the recovery capability of any nation, preventing nuclear blackmail. The Trident system will contribute to arms control stability, since its high pre-launch survivability and potential effectiveness against a wide spectrum of Soviet targets will reduce the value to the Soviets of further investments in heavy land-based missiles and any first-strike advantages those missiles may currently appear to offer.

To sum up, the Trident I missiles are deployed on backfitted SSBNs. Our first Trident submarine, OHIO, will join the fleet next month, and work is underway on a more advanced Trident II missile. The key mission of our SSBN forces, deterrence, will continue to be met for a long time to come.

**Question.** Admiral, is it possible to accommodate the MX? And is it likely that the Navy may want to be considered as basing for MX after '84?

**Catola.** I don't think it's practical to backfit MX into Trident. The MX is a much larger missile than Trident is designed to carry. Secondly, the MX missile has a liquid propellant, a disadvantage in a sealed atmosphere. We shudder at the thought of that on a submarine. A study of basing small numbers of MXs externally on small diesel electric submarines looked at the aspects of survivability and practicality. As a concept, it is a possibility. It

has its own problems, and when you consider cost-effectiveness, you find that it is much more expensive to put small numbers of missiles on many small submarines than to build a normal-sized submarine with many missile tubes.

**Question.** Admiral, Dr. DeLauer said that Mr. Weinberger and he were nervous about the slow data rate of communications to subs. What sort of communications do you think are needed?

**Catola.** We expect to backfit Trident submarines with an ELF capability. In fact, we will undoubtedly backfit our entire SSBN force with ELF. We do have communications continuously. One of the mission requirements of the strategic force is to have 100% communications. Currently, those are primarily VLF communications, which require the use of antennas which are either on the surface or directly below the surface. With ELF we will be able to go much deeper, and we can employ it in any of several ways. It can be employed under a bell-ringer concept, to indicate that a message is coming and that the submarine must come shallower to get it. Or, properly made up, the whole message could get through in a short period of time. I don't know exactly what the speed is. You can probably get Admiral Tomb to talk more about that tomorrow.

**Question.** What is the function of torpedo tubes?

**Catola.** Torpedos are used as defensive weapons. At the present time, Trident is equipped with Mark-

48 torpedoes for use in defense only. The strategic mission requires these submarines to stay clear of other ships, to maintain themselves in a posture prepared to launch on short notice, so they wouldn't be performing the same type of mission as our attack submarines which seek out targets. However, they must be capable of defending themselves, and that's the purpose of four torpedo tubes and the defensive weapons load.

**Question.** Could you bring us up to date on the IOWA-class battleship? Are you expecting any of them to be brought back into the service, and if so, how many? What are you going to do with them? How will you arm them? More importantly, how will you defend them?

**Catola.** I can answer that in general. We are bringing out the IOWA-class battleships; we intend to bring out all four of them. We are backfitting them with Tomahawk, Harpoon, and other modern weapon systems so that they will be the center of some of our battle groups. They'll be protected then, not only with their own weapons, but with those of the rest of the battle group.

**Question.** Has there been a decision on the D-5 configuration?

**Catola.** No, the D-5 is getting an early look right now and the configuration has not yet been pinned down. Several alternatives have been reviewed, but no determinations have been made. As I said before, the D-5 has an '89 IOC.

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**Q**uestion. You mentioned that you had a lot of associate contractors in your management scheme. I'm wondering if you can describe your management scheme to us, and how you feel about it?

**McCartney.** Well yes, we do. We have some 12 or 14 major contractors, each of whom is responsible for what would normally be called a subsystem; and we in turn assume the responsibility for integrating those. I think it works well. You know, it has been said many times — and properly so — that it's very easy to get competition into a program as you initiate it. In a very large program, the challenge is to keep up the competition five years into a ten-year program. The associate contractor scheme permits us to do that. This management approach was very successfully used on the Minuteman, so we are comfortable with it. We think it works well and we intend to continue it.

**Question.** Could you bring us up to date on the current state-of-the-art of tracking submarines — our ability to track enemy submarines and vice versa — and what has happened recently? How difficult is it?

**Catola.** I can say with great confidence that we still enjoy a significant lead over the Soviets in the area of acoustic tracking of submarines. The Soviets are working hard to narrow that, and we are continuously assessing the threat that their advances pose. They are also working in many other areas besides acoustics, such as magnetics and radar. None of these, though, judging from our analyses, provides any capability for open-ocean location of submarines.

**Zraket.** I wanted to ask you, General Herres, how SAC feels about the air-launched MX. In your mind, what are the pros and cons of such a system?

**Herres.** The SAC-supported approach to making

the MX survivable as the leg of the Triad providing ICBM characteristics was the Mobile Protective Shelter (MPS). It is a value judgment how best to make the MX survivable. It has not been SAC's position that the airborne patrol aircraft is the best approach to that. Obviously the MPS is our approach. The hardened silo is another approach; we don't regard it as providing quite the same degree of survivability, but it has other advantages and it really buys us time to look more carefully at more convincing methods of making the MX survivable.

**Zraket.** Are your reasons for not liking the air-launched mode economic or operational?

**Herres.** I think the O&M costs would eat us alive. And there is another aspect that is important. You are in a gray area as to whether you have a Triad anymore. If you can keep the thing airborne all the time — which theoretically you can do, although it would be awfully expensive — then maybe you do have it, but I'm not too sure. If you have part of it on the ground, then you have to ask yourself whether you really have a Triad anymore; because you give up some of the characteristics of the leg that the ICBM provides — one of which I mentioned a few minutes ago: day-to-day alert rates of 98 and 99 percent. It's hard to achieve that with any other system.

There are other problems too, but you are in a grey area between that and the manned bomber with an ALCM.

**Skantze.** Anytime you get a manpower-intensive system your alert rate drops dramatically. We looked at air-launched systems on a preliminary basis, and prelaunch survivability is a particularly vexing problem. If you put that system over the ocean areas, it wouldn't be a bad target for a Russian cruiser needing some target practice. We are, however, going to explore how to go about it, and we will do some intensive concept definition. Because it has an out-year budget line I expect we will do a fairly intensive examination of it in conjunction with Forrest McCartney's people.

**Kahn.** How trackable is such an airborne system from satellites or from other airplanes — or do you have to keep them over land? How trackable are they from the ground, say from a cruiser?

**Herres.** I don't think we can answer that without getting classified, I'm afraid.

**Question.** Admiral, about arming the submarine with the torpedos for self-defense: what sort of threat, what sort of possible attack is that protection against? And is there no defensive missile capability for that, maybe from an air attack?

**Catola.** The Mark 48 torpedo is an anti-surface-ship and antisubmarine torpedo. It could be used in either case, should you be in a position to launch and find yourself encountering an ASW threat from either one. We currently have no defense against aircraft except to stay clear of them. We're continuing to look at various development programs in case we determine that we must address the aircraft threat.

**Question.** Would either of you care to comment on the allocations, allowances or systems you're using to deal with C<sup>3</sup> with respect to the two major systems just discussed — the B-1 and the Trident? You didn't raise any particular problems in designing those structures to accommodate C<sup>3</sup>, or any advantages for modern C<sup>3</sup>.

**Herres.** I think some of that will be discussed in Session III. With that, I offer the opportunity for both gentlemen to comment.

**Skantze.** As far as the B-1 is concerned, there is a basic command and control structure by which SAC operates the bomber force. The B-1 force would fit into that same scheme of command and control, with the exception of the programming to add communications, like additional low frequency communications. I wouldn't anticipate any dramatic change in the methodology SAC currently uses to control the bomber force. If we were to go to additional satellite communications, that would not be restricted to the B-1; I suspect, though, that it would cover the B-1 as well as the B-52 force.

**Herres.** I would simply add that the problems are independent of the weapon system. The basic problems we see from an operational standpoint are the electronic and physical survivability of the medium or of the systems that are used. And that's a problem no matter whether you're talking about a B-1, a B-52, a Minuteman, an MX or what have you. Clearly you've got to put the receivers on the systems themselves, but selecting the receivers that correspond to systems that optimize your survivability, both electronically and physically, is the tricky part. I think there will be plenty of opportunities to get into that in Session III. In fact, I think it will be hard to avoid.

It's relevant from the standpoint of the characteristics of the Triad, though, because each of the legs of the Triad has differing characteristics with respect to the command and control connectivity problem. The ICBM probably has the most and widest variety of sure ways of getting communications — getting messages to and from the system —

and the best chance of continuous communications. The airplane is good within its operating areas, but there are problems when you get out of range of a certain medium. The submarine has its own unique problems, and the ELF debate pretty well brings those into focus.

So each leg has its own characteristics, and that's very important, because it's another way of illustrating how important the Triad is to the credibility of our nuclear deterrence. In my view, the extent to which these systems complement one another spreads to the whole array of their capabilities: throw weight and survivability, prelaunch survivability, flexibility, application and retargeting, and all the things one can do or might want to do with these systems. Some have greater, some lesser degrees of those characteristics. C<sup>3</sup> is certainly among them and is a very, very important part of the picture.

**Catola.** Trident was designed and built with essentially the same command and control system we have for the rest of the submarine strategic forces, with the capability to backfit new systems as they become necessary. Space and weight have already been reserved for ELF, and the ship is designed to take on other improvements also.

**Question.** Our strategic concept is based on the Triad, and so is the Soviets'. Apparently we got into that configuration before they did because we had the fleet ballistic missile before they did. So we are both in the same basic configuration in terms of mutual deterrence, or whatever you would call it. Knowing that systems change, what do you estimate the next generation of a Triad might be, and what work is going on to keep us ahead of the Soviets in terms of the total strategic picture?

**Herres.** We at SAC hope that the configuration in the next generation of the Triad will be the MX, the B-1 and the Trident. I don't think there is any question about that. What comes after that is a function of some of the things that have been discussed. It gets pretty grey out there, because we're talking about some distance into the future. Perhaps the advanced technology bomber will be a part of it, whatever that is. The kinds of things we are talking about as a follow-on to that are — what did you call them, Larry (Skantze) — pieces of paper in the back room: designs, concepts and so forth.

**Skantze.** I might say a few words about the air-breathing leg of the Triad (bombers) from a developmental standpoint, trying to project ahead. We are some distance from getting to an advanced technology bomber. We think we understand what

elements there are in the critical technology and how to develop them. But it takes time and it involves risk. At the same time you may have noted that in his decision the President clearly said that we would increase the cruise missile buy. I think we know how to improve the cruise missile. Specifically, there's an improved Williams engine under development now — the 14A6 which will increase the thrust significantly. There are some obvious things to do in terms of smoothing the platform and decreasing the radar cross section. I think in the year ahead we will be looking at improved cruise missile designs, because we would expect those still to be part of the air-breathing force. I think those elements, and how well we achieve reduced radar cross sections, and how strongly the very high speed integrated circuit (VHSIC) technology influences our systems, will be extremely significant. I think that we will be able to do more in smaller sizes, yet retain a very low radar cross section. Fundamentally, we see these air-breathing systems going in that direction.

**Herres.** There is one other aspect of the question: about characteristics and how the characteristics might change. I think one of the differences between our Triad and the Soviets' is that we carry a larger piece of our delivery capability in our manned bombers, in terms of throw weight, than do the Soviets. And I think that will continue to be the case in the next generation, remembering that the next generation — the B-1, the MX, and the Trident — will be complemented by the B-52G and H models as ALCM carriers. You will recall that the G and H models are about 15 years younger than the D models, which we are taking out of the inventory this year and next. The G and H models are being modified now with the offensive avionics system modification that General Skantze discussed. They will be in the program for quite some time to come. The H model has a tremendous range capability with turbo fan engines. There will be 150 ALCM carriers. They will continue to be a big piece of that air-breathing part of the Triad, because of the ALCM and its capability. Incidentally, this new book — I brought it along in case I needed to look anything up — is kind of interesting. It's got a lot of good information in it — *Soviet Military Power*. This has been somewhat highly publicized. It was just put out by OSD, and has a lot of good figures.

**Scowcroft.** It seems to me that to give the B-1 enduring survivability, it has to have short field or unimproved field capability. Is that being designed into the aircraft?



**Skantze.** No, I think the B-1 will have the takeoff requirements originally envisioned. I go back to the statement I made when we advocated the package: that the B-1 force of 100 would be configured to do a certain fundamental mission, but would inherently have the characteristics to expand to more. I think what you are implying is that maybe the President has the impression it will initially have a whole bunch of those characteristics.

For example, some of the investigating people who came by had a list of every conventional weapon anybody ever thought of, and said, "Have you allowed for carrying each one of those weapons? Have you allowed for the fire control system that does so and so? And when will it all be tested?" Inherently, the B-1 will be able to grow. But we made a conscious decision to aim it toward the fundamental capability plus the cruise missile carriage, at least to begin with. The other things, I'm sure, will come to pass as the plane evolves. But they are not currently in the program — at least they're not in the one I'm trying to negotiate with the four major contractors.

**Question.** I wonder if someone on the panel will address the question in the President's package of submarine-launched cruise missiles? We seem fixated on the deterrent Triad. Perhaps we have at least a Pentad. Perhaps, in terms of penetrativity and survivability, there aren't simply three legs. There are actually different sets of different modes of both basic and penetration; and while from the point of view of redundancy that's not a bad thing, we hurt ourselves when we focus so quickly on the number three.

In fact, looking at the package we announced last week, one of its most interesting components might have been the proposal for the submarine-launched cruise missiles, particularly in the light of current political problems associated with putting ground-based cruise missiles on the continent of Europe. You may have heard last week's proposal to position cruise missiles off the shores of Europe, because of the political difficulty in Europe. It's odd that we haven't heard that mentioned once here. Could we hear a little about the timing and deployment and missions of those submarine-launched cruise missiles?

**Catola.** From my viewpoint this came as a bit of a surprise. In fact, I too was surprised it wasn't mentioned earlier. We are building the capability into our attack submarines (we were doing so even before the announcement) to launch Tomahawk missiles using a vertical launch system in the 688-class

submarines. But the land-attack nuclear version of that was not initially in the Navy plan. We're still looking at that, and I'm not prepared to talk about how it will be done or the implications of it.

**Comment.** There were two reasons for the decision to put the cruise missile on the submarine. One was that we could get more strength quickly, and since we are seriously behind the Soviet Union in strength, that was a very important reason. The second reason was that the missiles that we will deploy in Europe are vulnerable to surprise attack. Indeed, their presence there, along with the pre-positioned materiel, the nuclear storage, and our dependence on runways and other attributes of mobilization, mean that to some degree we are making Europe into a gigantic Pearl Harbor. We would like to decrease the incentive for that. Having a good force at sea that we could use if the Soviets take out the land-based force is, we think, a good way to do that.

**Zraket.** I wanted to ask Larry (Skantze) the same question on the air-launched cruise missile. What will happen to the ALCM program? We talked about the B-1 as a penetrator; it can carry 20 to 30 cruise missiles. Is there a program to outfit the B-1 with cruise missiles immediately? What will happen to the B-52 cruise missile program?

**Skantze.** Well, there's an increase in the total buy of cruise missiles. We were going to buy about 3400; now it will be close to 3700. The funding to put the cruise missile on the B-1 starts in '83. We had already planned to put provisions in the configuration so that the strong back part would be built into the hardpoint structure as well as a moveable bomb bay divider in the front bomb bay. So those provisions were already in. We may also look at upping the rate, and we will outfit B-1s as well as continue the original program for the B-52s. That's why I made the earlier comment. Looking at the number of years over which that buy takes place, if you have a logical break-in point for the improved engine and some obvious radar cross section reductions, it makes sense to just do that kind of P<sup>3</sup>I upgrade.

**Herres.** We're planning in SAC to have cruise missiles for both the B-52G and H, and for the B-1. But we'll still be producing them for the Gs and Hs with the mods for quite a while. I'm pleased to confirm what Larry (Skantze) said about the unit at Griffiss. It was one of my units in the 8th Air Force; I'm very pleased with the progress we made up there. We're training crews, and we're flying the first ALCM-modified B-52G. The program is not

without problems, of course, like any new program, but it's doing well.

**Question.** To continue with the B-1 questioning a little bit: this morning we heard some fearsome things about Soviet strategic air defense. There were figures quoted: 10,000 surface-to-air missiles, 2500 fighter interceptors, 6,000 radars. With the decision to go ahead with the B-1 and the continuing emphasis on cruise missiles, it seems to me that penetration becomes a very real concern. What can you say in a public forum to reassure people that these air-breathing elements of the strategic forces can really get through?

**Skantze.** Well, as I said earlier in my discussion, we do have the B-1B, the modified B-1. I might point out that it is about 80% common with the B-1, or stated another way, about 80% of the original B-1 design is in tact. We had a fairly extensive developmental test program on the ALQ-161, which was the AIL defensive system. Although that kind of testing was engineering oriented rather than operationally oriented, we were nevertheless encouraged as to how the ALQ-161 would perform against modern threat systems — like F-15s, AWACS, and combinations thereof. In addition, we know with a high degree of confidence that we could reduce that radar cross section considerably. Now, if you take that combination and run it on its operational profile of 200 feet above the ground at .85 or .9 Mach, and you program it against real defenses as they are plotted and known in the Sino-Soviet landmass, you are not running each individual bomber against a thousand line-of-sights. In effect you just use line-of-sight as an effective defense. The aircraft is rarely, at any given point, in more than two low-level radar coverages. The opportunity to track and fire against it is limited in that sense. But I want to assure you that very extensive penetrability analyses have been performed and looked at in excruciating detail by the people on Dr. DeLauer's staff. For the foreseeable future, we feel confident that the B-1B is going to be a successful penetrator.

**Question.** If I could follow through on two lines — to what extent does your conclusion depend on coordination with other strategic force elements: precursors in flight?

**Skantze.** The analyses did not include precursors. So precursors that would take out air defense command and control sites would be an additional advantage. The analyses were run against a pristine system, undegraded.

**Question.** The second question would be: to what

extent does the conclusion depend on present Soviet capability, as opposed to what they can reasonably be expected to achieve over the next 5 to 10 years?

**Skantze.** I assure you we went through some painful, excruciating projections of what we thought the Soviets would have after 1990, and that was the benchmark. So we did take that threat into account, as best we could.

**Question.** And that was something like the current U.S. capability?

**Skantze.** Current plus, let's say.

**Herres.** From the standpoint of the people who've got to fly those airplanes in there, I don't see the curtain dropping overnight on a penetrating bomber for a long time. It will never really drop overnight. There will be gradual shifts in the advantage that one system has over another. Our radars are getting better, we are able to fly lower and lower, and the radars they have can't see through the earth yet, and they still have the basic physical line-of-sight problem. The Soviet Union is an awfully big country to protect with the SUAWACS, and the penetrator has a lot of advantages. It's not an easy environment to penetrate. It is a challenge. But penetrators will be around for a long time, and the ability to get through those defenses will be with us for a long time. I could underline that by reemphasizing what General Skantze said earlier when he was talking about Linebacker II during those eleven days over Hanoi, the most heavily defended area that anybody could ever imagine. I believe my numbers are correct — there were 721 sorties flown and 14 airplanes lost. In fact, I believe in the last two nights not a single airplane was lost. Pretty impressive, and they were not flying low either.

**Question.** To what extent are the Services integrated in their communications? For example, regarding penetration by a Russian submarine: presumably the Navy is watching for that and would track it, and the Air Force is watching and would try to track it. Do the two communicate? Are we that simply integrated? Would they, by design, track independently? Or would they coordinate immediately?

**Herres.** I think I can answer that very simply. The Commander-in-Chief for the North American Air Defense Command in Colorado Springs is in constant contact in a variety of ways with the Commander-in-Chief of the Atlantic Fleet, which is where a lot of sub tracking activity takes place. And my boss at SAC is kept well informed, on a

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microsecond-by-microsecond basis, as to the results of that activity. So there is close coordination, and it is orchestrated by the Joint Chiefs of Staff.

**Question continued.** And overlap is built in? You would be looking for submarines even though — ?

**Herres.** You're talking about systems developed to track Soviet submarines?

**Question continued.** Yes.

**Herres.** Well, yes and no. There are missions assigned to different commands, and I'm not sure I know how to answer your question.

**Question continued.** I wondered if you have a Triad concept on the defensive posture — on the watch posture — as well as on the offensive?

**Herres.** I think I see what you mean. I can't answer that question very well with respect to submarines; in fact, I'm not sure we could answer it without being classified. But I think it's fair to say that the comparable concept in the defensive world is called "dual phenomenology." I'm sure that General Hardinger would like to sell the concept of "triple phenomenology," but he has enough time and difficulty trying to get the money for "dual phenomenology." The idea is that in the business of detecting threats, one would like to have two different phenomena available as detection mechanisms, such as radar and infrared, for example — depending on what the system is you're trying to detect, what the platform is and so forth. That's the closest thing that I can think of to a comparable concept.

**Question continued.** I was thinking back to our submarine armed with torpedoes, facing a threat from an enemy sub. If a Russian submarine were penetrating our space, wouldn't we have already programmed something from the air as a major component of protection?

**Herres.** That's basically a Navy mission. Admiral, can you answer that?

**Catola.** ASW is a Navy mission. We do, of course, have ASW aircraft, surface ships and submarines participating in that mission. Any such detection as you have indicated would be sent back to headquarters and to the Atlantic Fleet Headquarters, primarily for the East Coast, and depending on the situation, action would be taken from there. Detecting a submarine in U.S. waters doesn't necessarily indicate an immediate problem, unless of course you're already in an advanced state of alert. Detection of a submarine under normal circumstances would be pursued by the Navy under peacetime rules of engagement.

**Question.** When a penetrativity study is done, sir, is it done by a dedicated group of protagonists or a dedicated group of antagonists?

**Skantze.** A little of both. They're done independently. The user is very skeptical of us. We develop these great things; he's skeptical as to how they work. In the case of the B-1, the users, the Strategic Air Command, have a good capability at their headquarters to do penetrativity studies. I happen to have a few people who are also capable, and there are people in the Air Staff who are very capable of doing penetrativity studies. And these are all really independent sources in many respects. We must make sure that everybody accepts a rationale, a set of assumptions. My impression of those penetrativity studies is that they are not optimistic; in fact they tend to be a little pessimistic. I think the three groups operated fairly independently, but came close to the same conclusions; and where there were differences, they had to find out how they differed in rationale.

Now in the same sense, Dr. DeLauer's people look at it all, and they have to be convinced. Programs and Analysis, who work for him, looks in great detail at how those studies were done — they have to be convinced. I assure you that a lot of the people involved are not protagonists, but in some cases skeptics.

**Question.** How serious are the personnel problems that the Navy and the Air Force face in the next two decades: to find qualified people to replace the personnel they're losing, and to meet their needs over the next twenty years.

**Catola.** I'm not sure that I can look 20 years ahead in the personnel business, but the Navy's personnel picture, I think, is looking up. We see improved statistics and retention for enlisted and officer personnel. We have sufficient retention to accommodate those ships that we want to build and as long as we continue to get the support in pay and compensation that we are currently enjoying, I see no problem in accommodating our needs.

**Herres.** I don't have much to add to that. I don't think it's going to be easy, though. We know that in the latter part of this decade we will see a smaller population in the age groups we're looking for. General Ryan, our new training commander, recently commented on this. It looks like we're going to be in competition for people — they're going to be hard to get — in the latter part of this decade, and we're going to have to build systems that don't take an army of people to maintain. I say that only partially in jest. We've got a tough road

ahead of us. I don't think we're ever going to see the day when we can pay the people we need in uniform as much as they could make if they were working somewhere else. We never have, and there isn't any reason to think that that will change. The best we can hope for is to keep that difference narrow enough so that the other things that make a military career rewarding and interesting, exciting and challenging will make the difference. That will take strong leadership, and a high quality officer corps. The Admiral's comments sound good, but it's a big problem.

**Skantze.** My particular interest is engineers. We have seen some diminution in the concern for pay because of the previous pay raise. And this one certainly helps tremendously. There is also a continuation bonus for engineers. That will help tremendously because for blue suit engineers we are not competitive with industry. So I think that situation is improving. A continual problem is the concern on the part of young service families about moving. More and more you find that wives work, have their own jobs, their own careers. They are reluctant to move, and that is a problem. Another problem we now face is that we are losing bright young full colonels.

**Question.** We need civilian recognition of what the military can do?

**Herres.** That's a good point. And I like to make that point every time we have a civilian group visit our headquarters. They tell us that there are a lot of things they can do to help us out, but one thing they need to do is make the military people in their community feel like what they're doing is worthwhile. That really means a lot to our people. And we don't have nearly as much of that as we used to have. It just doesn't exist in our society today like it did 25 to 30 years ago. People will do absolutely amazing things, if they know they're needed. That's more important than the pay you give people. The pay has got to be reasonable, though.

This is a big problem. I'd just like to add that in our avionics maintenance squadrons, for example, we're typically manned at around 80 to 85 percent. In my previous command, the Air Force Communications Command, I had 50,000 people, in general technically oriented. In all the tough critical-curve fields, in the peripherals where we had to be the most competitive with the outside world, the manning ran at about 85 percent. When you are at 85 percent of the manning you need, there are only two things you can do: cut back on production — have less pure weapons systems available, less of

the job getting done — or work your people harder. If you work your people harder, you encourage them to go find some place else to work. It is a vicious circle — the more you work them (they can take just so much of 12 hours on and 12 off, five and six days a week) pretty soon the reenlistment rates go down, you're manned at a lower rate, and you've got to work the remaining guys harder. You can't go on like that; we've got to solve that problem.

Let me just sum up briefly what I think we heard our speakers say. Initially, I believe, a good point was made that the administration has made a decision which acknowledges, as I interpret it, the importance of the Triad concept by announcing that the bomber leg, in the form of the B-1, will be modernized, and that the land-based ICBM leg will be modernized with the MX. I think Dr. DeLauer drove the point home — there will be an MX. And what's important about that and the bomber decision to me is that the Triad concept will continue to be etched in stone and an article of faith.

It's clear that finding the right way to configure the MX system to maximize survivability is an ongoing issue, and that the administration's approach is to buy time with the hardened silo approach for initial deployment.

The B-1 is a much needed B-52 replacement which will keep options open regarding an advanced technology bomber, and there is plenty of time to decide whether to have a hundred, or more than a hundred. There is likely, however, to be a tough fight in the Congress, and the possibility of that may have been overshadowed by the MX debate. Nevertheless, ASD is optimistic about the program's cost, schedule and its performance. Similarly, the Ballistic Missile Office is confident about MX development, notwithstanding the basing issues. Again — cost, schedule and performance look good. They are working on the silo basing concept now, and other ongoing studies are being generated to look at other options, both at the Aeronautical Systems Division and at the Ballistic Missile Office.

We had a very useful and interesting review and background of the current activities associated with the Trident program and the modernization of the SLBM leg of the Triad. Highlighted as significant were the logistics efforts, which will substantially increase the patrol time for the system to 66 percent. That is a significant increase in our national capability.

We also got an impressive view of the much enlarged operating area facilitated by the increased

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missile capability. One can imagine the impact that this will have on improving the survivability of this very important, most survivable leg of the Triad.

# **Session III**

## **C<sup>3</sup> Systems for the President and Military Commanders**

### **Introduction:**

#### **Lt. Gen. Hillman Dickinson, USA**

**Director, C<sup>3</sup> Systems  
Office of the Joint Chiefs of Staff**

**T**he subject of this session is C<sup>3</sup> systems, and from my perspective the most important word in that title is "systems" — because, as you really take a system approach to the problem of command and control, you find that this is the piece that has been given too little service in the past. If you think about it, the entire bureaucracy that works in this business has been organized to develop and field items project by project, with very little attention to the overall organization system. During the last administration, an effort was started in the OSD portion of the staff to look at C<sup>3</sup>I as a system. A little over two years ago our Directorate was organized in the Joint Staff to take the same approach — the system approach to developing, defining, validating the requirements and recommending priorities for funding those requirements, so that we could field this thing that would in fact be a system and not just a collection of pieces. We have been followed in a system of organization by a number of our commanders-in-chief around the world. And I believe this will have a major effect in the future.

Generally, when you speak to people about C<sup>3</sup> systems, eyes cross. Part of the problem is the extensive vocabulary of jargon used by communicators. It's really rather a simple idea. I make an analogy to the human body as a system. A body has eyes and ears that bring in the information. It has a nervous system that transmits that information to the brain, where various factors are put together, decisions are made, and those decisions are then transmitted to the body for action.

That's precisely what we're talking about — a system approach to C<sup>3</sup> systems. We have sensors that provide information. We have communications systems that bring information to the decision makers, who function with staff assistance at the command posts. And we have communications systems that transmit decisions back to the forces. It's just that simple, from the system approach.

The groundwork for the progress we're making now was laid by many. General Dougherty, during his time at SAC, had many of the ideas that are only now, finally, coming into the program and budget with a new thrust. General Ellis, Admiral Hayward, Jerry Dinneen — all of them had many ideas. The very marked support that we in C<sup>3</sup> Systems (C<sup>3</sup>S) are getting now in this area — exemplified best by the recent statements of the President — result from the recognition of C<sup>3</sup> systems as an important portion of our overall armed forces system. That is now very clear.

It's time to shift gears. We no longer have to convince people that there is a problem or that the support is needed. We now have to produce and field the systems that are being given the financial and manpower support. I think sometimes the real disasters in life begin when you get what you want. Jim (Stansberry) and others who will field these developments must make sure that we do in fact get what we want and what the people in this country deserve.

We're going to talk about the C<sup>3</sup> system, which, combined with the weapons systems that were addressed in Session II, will enable the National Command Authority of this country to execute the national policy. On October 2, President Reagan announced: "I have directed the Secretary of Defense to strengthen and rebuild our communication and control system — a much neglected factor in our strategic deterrent. I consider this decision to improve our communication and control system as important as any of the other decisions

announced today. The system must be foolproof in the case of any foreign attack."

That was said along with other statements regarding the strategic triad. It's really exciting to be able to participate in needed improvements to our country's C<sup>3</sup> system, and for the first time to have this kind of top-level support. This is a first. We've been told to rebuild America's defense in the way it should be rebuilt, and we will.

Vulnerabilities have been addressed. Strengthening will be the first order of business, to establish a system that in the words of the President, is "foolproof in the case of any foreign attack." We must be sure that we can employ our nuclear forces effectively if necessary, and we must make it clear to an adversary that we could employ those systems as a first order of deterrence.

To do that we need timely warning, to ensure the survivability of our forces. We need assessment of the attack to select an appropriate response. We need mobile command centers that can survive an initial attack, so that we clearly have the endurance, if necessary, and the means to direct a retaliation even if our fixed centers were destroyed. We need survivable communication links to ensure dissemination of orders to the ICBMs, to the bombers and the submarines. Over the past decade, we have not modernized communications and control systems fast enough. As a result, they are not as survivable as we would like, and they may not operate reliably over an extended period after Soviet nuclear attack. Based on the C<sup>3</sup> or strategic requirements of our commanders, we will be supporting the President's program in all those areas of concern.

The Secretary of Defense has issued guidance to accomplish several objectives. We will improve the survivability, performance and coverage of the radars and satellites that are used to warn us of a Soviet missile attack and to assess its size and scope. Dick DeLauer mentioned these briefly in Session II. We will have additional mobile ground terminals for processing data, and we will upgrade the satellites themselves. Those satellites and ground-based radars will be improved to give better estimates of the size and the objectives of the attack. We will deploy additional PAVE PAWS surveillance radars to watch for submarine-launched ballistic missiles. We will upgrade the survivability and capability of the command centers, including our Presidential airborne command

post, the E-4B, and the EC-135 airborne command post that serves our subordinate commanders in the field. They're being hardened against nuclear effects and equipped with upgraded satellite VLF and LF communications. We will deploy survivable communications that link the command centers with all the elements of the Triad. I think we mentioned the VLF and LF communication receivers for the bomber force as an example that is pertinent. We are upgrading the communications to the deployed submarines. And finally, we are develop-

ing and fielding a new satellite communication system at extremely high frequency that will be far more survivable than anything we now have.

We will also have a vigorous, comprehensive R&D program that should lead to continuing fielding and upgrading of a communication and control system that will endure for an extended time beyond the first nuclear attack. These initiatives will significantly improve the survivability and endurance of our communications and control systems, which must be as strong as the forces they support.



## Charles A. Zraket

**Executive Vice President, The MITRE Corporation**

I'll try to recapitulate a number of points that have been made on C<sup>3</sup>I by describing its technological infrastructure. I'll elaborate on remarks made about the current and planned system and what it needs.

Yesterday Dick DeLauer described an \$18-billion C<sup>3</sup>I package that is in President Reagan's defense program; I want to make two comments on it, one specific and one general. Specifically, since military satellite communications are very important to almost all the functions of C<sup>3</sup>I, it would be nice if a few hundred million dollars more were available in that \$18-billion package to upgrade the existing military satellite communications systems in addition to building the extremely high frequency (EHF) system that General Dickinson mentioned.

As many of you know, we currently have the UHF Air Force satellite and Navy FLTSAT systems. We have a defense communications satellite system

called DSCS (discus) that operates in the super high frequency band. And we have a number of domestic civilian satellites, and more planned in the coming years. Those assets could be upgraded to provide improved connectivity. While UHF does have some problems, such as scintillation effects, the problem with the EHF system is that we're not going to get it fully deployed, with a full suite of 3,000 terminals, for 10 or 15 years. So it seems prudent to also upgrade the current military satellite communications systems, make them more jam resistant and survivable.

The second comment is more general. To those of us who have worked in C<sup>3</sup>I for over 20 years, the package approved by the Secretary of Defense is a major step forward. But it addresses primarily the preattack phase and the transattack phase of a potential strategic conflict. The third phase, conflict management, is not really addressed in that

package except in providing for planning and some development work. The implementation bill will be much higher.

I have six slides that I hope will help you understand what it might take to build a technological infrastructure for an enduring C<sup>3</sup>I system which addresses some of the needs of the conflict management phase.

First, let's talk about the strategic command structure and its connectivity. Figure 1 shows all of the major commands involved in the decision structure, including the National Command Authority. As has been mentioned, we are going to improve all of our airborne command posts — the E-4s, that are being built to support the National Command Authorities — and harden them against EMP effects. We will also need ground mobile command centers and support staffs, well trained to support the dispersed decision-making authority that people talk about. We will need headquarters emergency relocation teams like those SAC is now exercising. We will need mobile communication terminals to go along with the mobile facilities. We will need what we call an "orderwire system" — predeployed communications that might take the form of a groundwave low frequency or adaptive high frequency system. In an attack, one can use such a system to poll the nodes and ask "Who is alive? Who's in charge?" and reconstitute the surviving islands of communication. Finally, we would need, of course, all the kinds of satellite communications we've been mentioning. Not just the EHF system downstream but proliferated assets using many of the satellites, both military and commercial, that we now have. That is the kind of technological infrastructure that we need to give the command structure any real endurance.

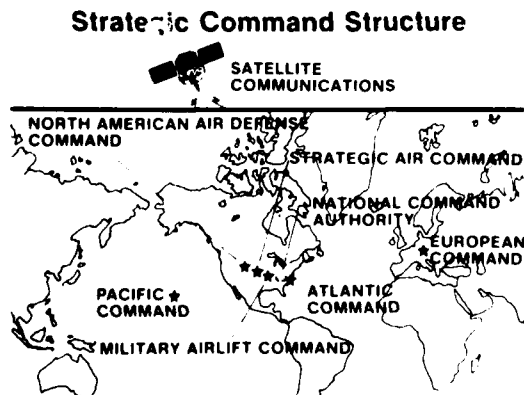


Figure 1

Figure 2 shows the planned improvements in the infrared satellite early warning system. Improvements are planned for the ballistic missile early warning system, to give it better raid identification possibilities. A couple of radars will be added to PAVE PAWS Otis and PAVE PAWS Beale to give them southern coverage. Mobile ground terminals will be added to gather data from the infrared satellites. There will be improved satellite communication links and backup microwave and landline links to disseminate the warning information. The plan that General Powers has put together will certainly give us a much more robust warning system.

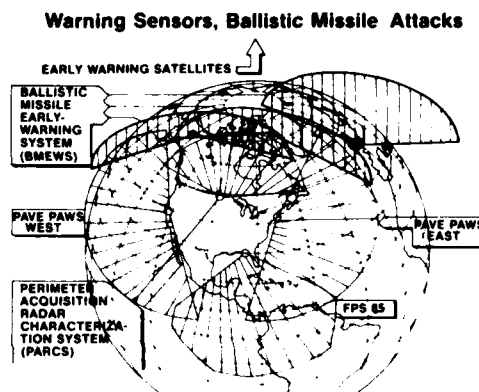


Figure 2

Regarding connectivity to the bombers, Figure 3 shows ground alert of aircraft, followed by positive control launch, force execution, and then aircraft recovery. One thing to remember about the bombers is that they can be recycled. We can launch the aircraft for survivability without actually ordering an attack, and the bombers can be recovered and reused. They carry standoff weapons such as cruise missiles.

The point here is to go through a sequence like this. We need enduring two-way communications to the bombers in all phases. That's going to take multimode communications: satellite communications to the bombers, adaptive high frequency communications to the bombers, and UHF systems. We need a number of communications systems to ensure that we have at least one mode allowing us to get to the bombers and back to the surviving mobile command centers.

Connectivity to the missile fields is a similar problem (see Figure 4). It is not as difficult as the bomber case, because these are deployed in the

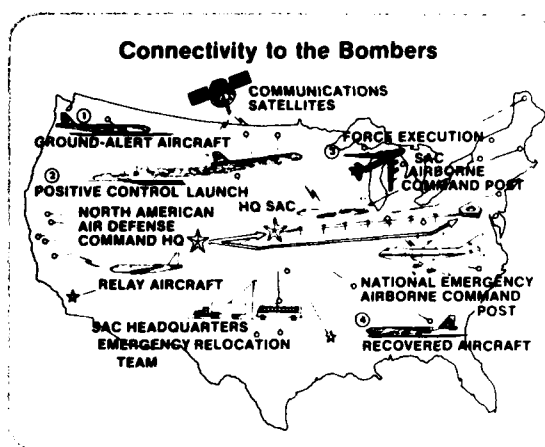


Figure 3

United States. Multimode communications to the missile fields are needed: very low frequency, high frequency, medium frequency, ultra high frequency, plus airborne relays. Communications should be two-way, since the MX, for example, in whatever mode it's deployed, will also serve as a secure reserve force in any enduring system. We must have two-way communications to the MX to determine its status and to give it any reprogramming we may decide on.

In connectivity to the missile submarines the primary problem is communications (see Figure 5). We have modes such as very low frequency that are relayed through the TACAMO communications relay aircraft. That system can be improved technically by using directional antennas in the submarines. High frequency has been neglected until recently. With microprocessor control, with frequency agility, with adaptive filters one can improve the performance of high frequency systems

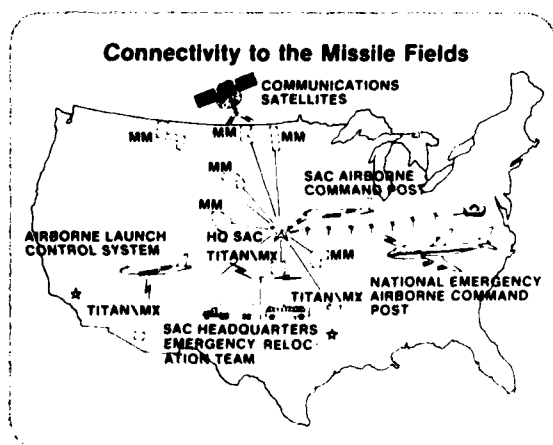


Figure 4

even in a nuclear environment; and I think these systems can play a prime role in any enduring communications system. These are in addition, of course, to the EHF satellites that can be used with submarines, as well as the research and development going on in blue-green lasers which can penetrate the water.

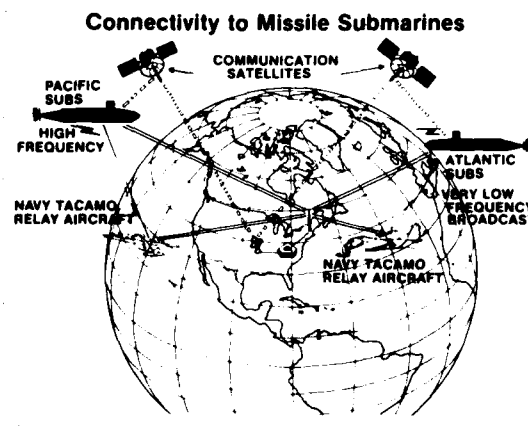


Figure 5

**Question.** Does that slide imply that Atlantic subs have very low frequency communications and Pacific subs do not?

**Zraket.** No, all subs have both. In fact, all subs have all modes of communications — satellites, very low frequency, and high frequency. There's even discussion that, if all these modes are killed in some way or other, we can pre-position assets — put up communication relay balloons, erectable high frequency and very low frequency antennas, and so forth. There are all kinds of things we can do to replace failed assets.

Finally, I want to talk very briefly about intelligence gathering, the "I" of C<sup>3</sup>I (see Figure 6). The improvements discussed above would not make any sense without data to let us know what's going on. And the problem here, as Dick DeLauer indicated yesterday, is to make our existing space, airborne, and ground intelligence gathering assets as survivable as possible. Most importantly, we must provide for their replacement in the event that they're knocked out, and we must provide mobile, survivable centers, in submarines, airplanes or on the ground, to get the information and process it.

To develop and deploy all these kinds of C<sup>3</sup>I technical capabilities will be a very formidable undertaking. It will cost tens of billions of dollars over the next 10 years, over and above what we're currently spending if we expect to address the conflict

management phase. It would certainly take at least another 10 years. Even after doing all of this, it's not clear how long such a system would endure, because of the uncertainties associated with nuclear warfare. Endurability would depend very heavily on the scale and timing of the attacks and so on. However, I believe that the investments in these capabilities would be very worthwhile, because they would contribute greatly to the stability of the strategic balance and to the flexibility and safe control of our forces. As has been mentioned a number of times, the real problem in deploying all of these C<sup>3</sup>I assets and the forces they control, is that we've got to test and exercise them many times under disruptive conditions during peacetime, to be sure they will operate reliably in a crisis, and that they will provide an assured response rather than just a prompt response. Such testing is sometimes a distasteful thing to do on a continuing basis, especially for the civilian hierarchy in our country.

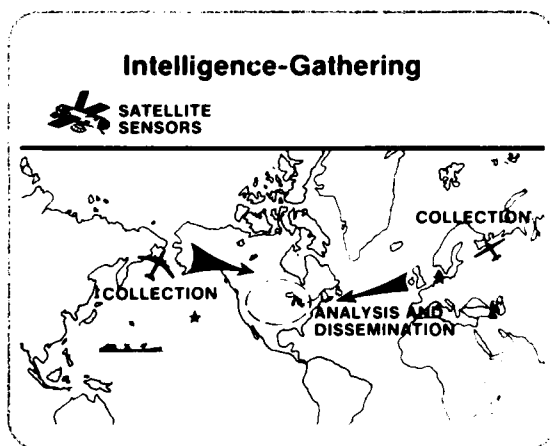


Figure 6

So it's not enough just to have a good technological infrastructure. The systems must be used and exercised and tested constantly to be sure that they work. With that I'll conclude my remarks and answer any questions.

**Comment.** Just a point of clarification. I think that you'll find that the decision package did, in fact, include dollars — particularly in the out years — to address the enduring force management issues. The planning wedge is not as large as some might have preferred, but it's a little difficult to put large planning wedges into budgets. It's necessary, I think, for the people in the field to come up with concepts that are more concrete — not to use jargon — if the budget is really to reflect this area. I

would also say that I think the community at large owes a vote of thanks to Jim Wade in this area for the connectivity review conducted over the last several months. That review has played a great role in this portion of the budget package, which will be continuing, with its focus primarily on enduring force management.

**Zraket.** I agree with you certainly that Wade's has been the major voice in this matter. I would comment that planning wedges are not enough. You need development and acquisition money. That's not in the budget. I think Hill (Dickinson) might want to address himself to that too.

**Comment.** Well, there are several billion dollars, and that's not just planning, in my view. That's intended for acquisition.

**Dickinson.** In developing the recommendations in that package, we certainly gave higher priority to those that do have the longest endurance. Not everything has longer endurance, but some of the things needed for pre- and transattack use also have some endurance capabilities. For example, there are very substantial additional resources for ground mobile command posts.

**Zraket.** Well, the last thing I want to do is criticize the package, because I think it's an outstanding one. I think the point is valid, though, that by no stretch of the imagination will that package give us a fully enduring capability. That's not a major criticism, I think; we just ought to state it as fact, and not fool ourselves that we don't still have a long way to go after this package. It's a tremendous step forward, but I would say we need to do more to achieve our objectives, especially in the intelligence area.

**Question.** As part of the enduring capability you're seeking will you have a tactical warning and attack assessment capability at all?

**Zraket.** I would wrap that question into the post-attack intelligence data gathering. Intelligence, it seems to me, would have to function as a collector of what's going on and what residual capabilities are left.

**Dickinson.** If I might add one comment to that: first you want to know which of your own forces, and which of the enemy's forces, remain. The first-order information is one part of that: where all the nuclear detonations went — friendly and enemy. Yes, there are considerable funds in this, and it probably needs to be made even more enduring than it will be in this package. In addition, you certainly would like other intelligence, and that is being addressed.

**Question.** I've missed any discussion of tactical or theater C<sup>3</sup> in relationship to strategic C<sup>3</sup>. And yet one of the large issues is what a European battlefield would look like. Could you or the panel address the relationship between survivability and endurance of C<sup>3</sup> in the European theater and the strategic systems you've addressed.

**Zraket.** I'll say something about the technological aspects of it. The kind of program that is now planned, and the additional improvements we've talked about, would certainly connect the European commands to all the other commands in the strategic area. So you would have command interaction, or connectivity, between the theater forces and the nuclear forces in the U.S.

Within the theater itself — I don't know very much about the planned Pershing system — but the ground-launched cruise missile program that's planned there has about as much survivability as one could build into a nuclear weapon system in Europe. That was one of the prime criteria for its deployment. That's not to say that it's invulnerable, but it has very good survivability characteristics, especially in a conventional war. One has to look at the theater nuclear force in the context of the total strategic force; the theater nuclear force can be targeted and knocked out by a determined adversary. But if you look at the timelines, you'll see that it is very difficult to knock that force out without providing very unambiguous warning for the U.S. It would be difficult to time attacks on Europe and the U.S. that would knock out both simultaneously.

**Question.** Yes, one senses a feeling of gratification about this new package and the expenditures for improved C<sup>3</sup>. Yet a potential worry arises from this discussion too. C<sup>3</sup> systems have been characterized by words like survivability, endurance, flexibility, responsiveness, credibility. Those things are a lot harder to hang a number on than, say, missile system accuracy or circular error probability (CEP). To what extent is there a feeling that the state-of-the-art in C<sup>3</sup> design and analysis is there to support and make the best use of the addi-

tional funding that's going to be available? The danger, as General Dickinson indicated, is that sometimes the real disasters in life happen when you finally get what you want.

**Zraket.** I would say it's the wrong approach to try to pin down numbers on the individual hard-

ness of communication links, command centers or sensing systems. I think one has to do the best possible economically in terms of hardness against EMP, and in the area of mobility in the air or in ground terminals — make these centers as difficult to track as possible, make the transmission media difficult to jam, make them mobile enough so that they have the same survivability as the command centers. Overall,

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we want the C<sup>3</sup>I systems to be as survivable as the weapons systems they control.

**Question.** Along the same lines, can you say anything about the future competition for funds? There seems to be a conflict between the fleshing out of the generalized network and the spectrum of specific requirements that may not be met by the general network. In other words, as the network does become more survivable, how will one proceed to give priorities to better surveillance of early nuclear combat at sea, or in the European theater? In particular, it seems that the number of requirements for C<sup>3</sup>I in PD-59 far exceeds the present ability. Can those needs best be met by just working on the general network? Or must there be a tradeoff between further improvement of network survivability and missions oriented to support specific goals?

**Zraket.** Generally I'd start by saying that this is the first administration that has given almost top priority to C<sup>3</sup>I, and I think that's a very salutary thing. I think the general communications network we're talking about will serve this so-called command structure around the world quite well, if we build it. As I understand it, your question has to do with operations, say within the theater itself, or within a naval task force. Each of those, of course, has its own local, individual C<sup>3</sup>I requirements. By and large, my impression is that those local re-

quirements have been much better taken care of than the strategic C<sup>3</sup>I structure. For 20 years people just have not wanted to deal with the problem of building an enduring C<sup>3</sup>I system. It's just a distasteful thing, as many of us over the past two days have said. But in the local areas those C<sup>3</sup>I requirements have been better met. The C<sup>3</sup>I percentage of the total money being spent on those local systems has been small enough so that C<sup>3</sup>I hasn't been as neglected at that level.

There is one glaring exception to that, however, and that's in Europe, if the array of Soviet strategic capabilities that we have heard about in the last two days is any indication. The situation is even worse when one looks at their tactical or "conventional" capabilities, and their capabilities for electronic warfare, as well as weapons. In those areas our systems just cannot stand up, either in terms of physical survivability or in jamming resistance, to the Russian threat. That's a well recognized problem, and a large number of programs, started maybe four or five years ago, are addressing it. We went through a period in which, until about four years ago, NATO systems received almost no support whatsoever. The Carter administration put a lot of emphasis on NATO, and a lot of programs were started in C<sup>3</sup>I. I think we are now starting to go through the same process in strategic C<sup>3</sup>I that we did three or four years ago in theater C<sup>3</sup>I.

**Dickinson.** I'd like to amplify one point. Part of the problem of the top level systems — those at the National Command level and the unified and specified CINCs level, particularly the unified CINCs — is that neither of those echelons has had any direct representation in the programming and budgeting process. Down within the components, at the level of the fighting forces, is where there are programming and budgeting resources. And that comes, of course, from the reorganization acts including 1958, and roles of the services and the role of the unified command structure. But in part, that's one of the roles of our office, and the C<sup>3</sup>I office in OSD — to try for the first time to give programming and budgeting advocacy to those top two echelons of command that had no real advocate before. It's very difficult in a service budgeting session to draw attention to a CINC's requirements or even the President's requirements. It's amazing, but the President is a disadvantaged user in the programming and budgeting process.

## **Lt. Gen. Brent Scowcroft**

**USAF-Retired  
Consultant, International Six**

**A**fter talking to you very briefly about presidential decision making in terms of the requirements for C<sup>3</sup>, I hope to outline the tasks which C<sup>3</sup> has to perform if the President is to do his job satisfactorily in a strategic conflict. It's hard to separate, in this context, C<sup>3</sup> from the overall context of continuity in government, because C<sup>3</sup> is an essential part of continuity in government. It's not simply the physical survival of people. People don't exist in a political sense unless they can communicate. That's something I think we have to remember. So, it's all one big problem which puts a very heavy burden on our C<sup>3</sup> systems.

One important point I would mention is that, while in this conference we're concerned with the President as Commander-in-Chief and manager of the armed forces, the President is also the Chief Executive of the United States. In a conflict, this imposes traditional duties on him. He must com-

municate with the people. He must try to keep the national community, the society, together in a time that will be perilous to an extent none of us can really understand. Much of the physical structure for continuity of government was built during the 1950s and '60s. It is an enormous plant, very expensive but sophisticated for its time. It did a very good job, but improvements in accuracies have changed much of that and, as we learned in earlier sessions, we must operate on the theory that anything that can be found can be destroyed. So we now have to change our ideas about how to manage presidential security and presidential communications. We must move toward mobility.

Furthermore, much of the structure and the concepts introduced during the '50s and '60s have suffered substantial neglect. For example, the telephone system — AT&T was then very heavily involved in cooperative development. Since that time, however, the FCC has refused to let AT&T

add to its rate structure the costs for improvements designed for national security. So they just can't do that work. That's just one example of a number of things which have happened over the course of years which hopefully, as Hill (Dickinson) said, we're going to take steps to correct. But even that won't be easy.

I'm sure some of you have seen reports in the paper about the other telephone systems complaining about the AT&T role in any national security emergency, and so on. Well, in addition to the change in the nature of the attack that we have to survive, there have also been changes in our own strategies; beginning with system 246 and running up through PD-58 and PD-59, we have imposed new and very stressing requirements on our communications systems. For the first time, perhaps, we are seeing the President publicly put emphasis on fixing the systems on which we have put these requirements. It remains to be seen whether or not it will be carried through. I certainly hope so. Bob Everett and I have sat in study groups in the past and pointed out many of the problems that we're all aware of, and everybody nods, and yet things change only imperceptibly.

Let's look at strategic nuclear conflict. I think, in terms of C<sup>3</sup>, we ought to look at its three major components: preattack, transattack and post-attack. I don't like any of those terms, because they carry connotations that I don't think are accurate. Preattack is not bad. That is the development of a crisis up through the time that weapons start to impact on the United States, or on our military systems wherever they are. The next phase, trans-attack, is what I would prefer to call the automatic phase of the war. That is the time at which the quick response systems are discharged against predetermined targets and so on, and the battle plan unfolds more or less automatically. That will blend, maybe quickly, maybe imperceptibly, into the third stage, postattack, which I would prefer to call a conflict management stage. When you have finished your preprogrammed and preplanned strikes, the question is, what do you do, and how do you go from there to the point where the conflict terminates, if it ever does, and how do you do it? The requirements for communications are important in all those phases, but they are different.

The preattack phase was discussed yesterday as a bolt-out-of-the-blue attack, and I think, in some sense, that is accurate. I would not agree that it is a very likely contingency; the Soviets don't really operate in that manner. However, as nearly as we

can figure, they do believe in preemption should they once decide that war is inevitable. So we can't take great satisfaction in feeling that a bolt-out-of-the-blue attack is not likely, because even in a situation of great tension, the actual launching of an attack is likely to be a surprise. Hopefully, however, our forces will have been generated — that is, they will be on alert. You may have the bombers in the air and so on, and the President and his advisors will have gone over possible options and contingencies, and how to react to different kinds of attacks. So there will be some kind of preparation.

But that doesn't mean that an attack, when it comes, will not be a surprise. The President, in the event, may have less than ten minutes in which to make a decision and seek shelter. We all have our pet scenarios as to how a crisis would arise and how much warning we would have, how the decision makers would in fact react, and so on. Probably nobody is right, but we should not overlook the scenario of a fairly long-drawn-out crisis where nerves begin to fray, worry sets in, generated forces begin to degrade, and the forces begin to move back to a less ready posture. But let's look at the problem the President faces — with almost certainly less than ten minutes in which to make a decision — based on indications of attack.

DOD requires "dual phenomenology" — that is, before we assert that an attack is in fact underway, we expect confirmation by at least two systems that receive their information in different ways — one by radar, one by infrared, or what have you. The President has to convince himself, as well, that an attack is actually underway. Unless the Soviets are a lot dumber than I think they are, they will take that into account in planning their own attack, and within the exigencies of the military attack I expect they would do their best to make the first indications as ambiguous as possible, force the President to take as much time as possible, and thus lessen the chances that we would respond quickly. In order to exercise the attack options — which are becoming broader and broader, in terms of both plans and development of flexible systems — the President needs to know in general the type of attack he is facing. It is very difficult to provide him the kind of information, especially within the time he requires, that he will need to decide what attack option to employ.

Thirdly, when the President gets this kind of data, he needs to consult with his advisors. If the crisis is immediate, they may be right there in the White House with him. If not, they may not be able



to join him, and his contact may only be through conferencing calls of one kind or another. The presidential decision then has to be communicated from the President through the Command Center to the forces, following which the President has to get out of danger. I think you could assume that the President would want to stay in the White House during a crisis until the last possible minute. His leaving the White House would in itself be a signal, and could have serious repercussions within the country. Therefore he may stay too long and not survive.

The obvious thing to do, then, is to put some of the presidential successors, preeminently the Vice President, out somewhere that's unknown to the Soviets, to assure that one or more presidential successors would survive. They would each require staffs from the various agencies — Defense, State, Intelligence, and so on. To the extent that you provide them really skilled staffs, though, you cut down on the staffs in Washington who will have their own important functions. It's difficult to decide exactly how to make these people competent to do this very difficult job while not degrading the support to the President himself. Each group that you do put out has to have communications, has to be kept up on the situation so that it could take over if need be.

In the second phase, the more or less automatic phase of the battle, the President's tasks are relatively simple. He needs to be kept aware of what is going on, if possible. He needs contact with the forces able to respond which have not been automatically released and, depending on the kind of conflict, he may feel the need to talk to his allies or to the enemy. (I'll talk about that in just a moment.) At the very least, he needs to be able to communicate with the American people. This may be impossible, but provision should certainly be made for some kind of communication to the people about what's going on, and that he is alive and in charge.

When we go from Phase Two to Phase Three, as I say, it's a matter of the character of the war itself. If the President has managed to escape — say he gets to the Airborne Command Post — the presi-

dency may be in good shape. But that may not have happened. Assuming that there is a Military Command Center still existing somewhere, they may have no idea who the President is or how to find him. If they find one or more successors, there's the problem of determining whether or not a given

successor is the President. That may seem like an academic question in a situation like this, but nonetheless it is a problem, and it does impose a requirement on our C<sup>3</sup> system at a time when it is least able to meet it. Even if the President survives in the Airborne Command Post, the Airborne Command Post itself is survivable but not enduring. He can't stay up there forever. He has to have some kind of command post but to be

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effective he has to have communications to the forces. These may have to be reestablished, but they must be of such a nature that they cannot be targeted by whatever enemy surveillance still remains that could home in on the communications and thereby locate the President.

The President's chief tasks in this period for which he has to have communications are: first of all, to assess the damage done to the enemy, the targets still remaining, his own forces, and his ability to continue the conflict. In terms of the kinds of conflict we're talking about now, he also needs to communicate with the enemy.

There's a real dilemma here that we haven't sorted out. The kinds of controlled nuclear options to which we're moving presume communication with the Soviet Union; and yet, from a military point of view, one of the most efficient kinds of attack is against leadership and command and control systems. It's much easier than trying to take out each and every bit of the enemy's offensive forces. This is a dilemma that, I think, we still have not completely come to grips with.

Well, to summarize, there are three kinds of communications the President needs. First of all, in the preattack stage, he needs to set up continuity of government to his successors, and he needs to ensure that he can, in fact, get word to the forces before communications are degraded to the point

that that becomes impossible. During the attack phase, he (or his successor) must be aware of what is going on, and must be able to communicate with those forces still able to respond. In the enduring phase, he has to reestablish the national fabric and be able to continue the conflict or terminate it.

Because of our fixation on a kind of assured destruction strategy, if you will, we have spent most of our time, put most of our focus, on the first phase. We sort of blank out after we finish thinking about that phase. The enduring aspect, which fortunately we're now focusing on, is the part which may make all the difference. It need not entail construction of brand new command and control systems, but it requires recognition of the fact that in almost any kind of attack, the United States — which is a communications-rich country — will have islands of communications systems still surviving, and that the job may be to figure out how to put those islands together in a way which will allow the President — though maybe not in the sophisticated way he can today — to communicate with his forces and with the people. My colleagues are now going to tell you how that's going to be done.

**Teller.** I have two questions. First, I believe the Soviets are unlikely to attack us without first evacuating their cities — something of which we should be aware. That is apt to suggest a higher plane of alert or, at any rate, serve as a justification for the President to relocate. Has that been taken into account?

**Scowcroft.** Yes, I think it has. But even if you assume that the President can relocate, you cannot assume that his place of relocation can remain unknown. He can stay, for example, in the Airborne Command Post for a limited amount of time. He's unlikely to be prepared to do so for days, much less for weeks. If the Soviets evacuate their cities it is clearly a serious indication. But it does not necessarily mean an attack within the next 24, 48, or 96 hours. We have little experience with how our alert is going to degrade, in physical terms, in terms of impatience, and so on.

**Teller.** I would imagine that it is an indication of an attack within two weeks. I think, under those conditions, it constitutes a new situation that should be sorted through extremely carefully.

There is a second question which I'm afraid we cannot, for many reasons, discuss in detail, but I would at least like to mention it. Has consideration been given to concentrating the power of the President, and his various successors at various levels,

not only on commanding an attack, a counter-attack, but on restraining the usefulness of the weapons — in such a manner that the restraining power automatically lapses unless renewed periodically, and also lapses automatically under unmistakable signs of actual explosives hitting the United States? What I have in mind is a hierarchy where it does not pay the enemy to attack the top leadership, because all they do thereby is lose the people with whom they can negotiate. Instead, by having a system which fails armed, they have an interest in preserving our leadership. Has that been considered?

**Scowcroft.** You are very correct, Dr. Teller, we can't talk about it. Is that enough of an answer?

**Teller.** A little more than enough; perhaps I have to apologize for mentioning that such an idea could even exist.

**Kahn.** I'd like to continue with Dr. Teller's questions even though we can't talk about them. On the first one, we all have our pet scenarios for war, and of course that's not the issue, because you've got to be prepared for all of them. You know that better than anybody. My favorite scenario, nevertheless, is a very tense situation in Europe, probably bombs bursting, a loss of control at least in Europe, enormous pressure on the Soviets, enormous pressure on us. Each side is trying to get the other side to back down, and you have to understand the likely dialog, "One of us has to be reasonable and it ain't going to be me." And then they announce that they are going to evacuate their cities, and the evacuation is very effective. Of course, they tell their own people and us that they're evacuating, and that by some specific time the cities will be fully evacuated, not 80 percent, but 95 percent, and everybody will be in shelters — "Because that's when we intend to pressure you — or even strike if you don't back down." They may also let you know, "Against our own doctrine (we have picked up some of your own ideas) there will be a very clean strike; we will avoid your cities, and maybe you will not want to hit our cities in retaliation."

The command and control requirements now are very severe. For example, one may not want any devolution of authority to fire because we may not want people shooting at cities. This may reduce our deterrence, but you think there may be a war anyway. My question is, To what extent have we thought through this kind of very specific scenario which I think is far and away the most reasonable scenario for a war, or for us backing down?

**Scowcroft.** I would venture to say we've not

thought through all the possible scenarios sufficiently, and partly for the reasons I've discussed. There are a number of very stressing scenarios. As I think you will hear in a few moments, many of our surveillance systems are very vulnerable in a connectivity sense. What happens if they go blank? What do you do? You could go through a lot of things. One response, if the Soviets say they're going to evacuate their cities, or start to, is to say, "Okay, but at the first indication we'll attack."

**Kahn.** And I would think they'd counterattack. And with the current balance of forces we might prefer extending the negotiations and risking a Soviet attack, to getting the first strike advantages but making war certain.

**Scowcroft.** In any case, we need to pay more attention at the highest levels in terms, not of scenarios — you can go on forever with scenarios — but in terms of the kinds of stressful things that may be involved, and what they do to your command and control.

**Kahn.** What interests me is your statement that we might attack if they evacuate. It is an almost standard first reaction I get from senior people, but it may be a most improper tactic.

**Scowcroft.** I think it is too. I think it's also improbable that the Soviets will in fact evacuate.

**Kahn.** Oh, I don't think they'll evacuate unless they feel they can still deter a U.S. strike; to evacuate is almost as fateful as to strike.

**Scowcroft.** It may be worse, because what it does is absolutely ensure that our forces are generating.

**Kahn.** Absolutely. Every submarine is out of port. Every plane is on alert. I'll argue that between the two different scenarios there are two serious cases: the surprise attack out of the partial blue, that is, a tense situation, in which you're sort of prepared but you're not that fully generated. I'll argue that between the two, if I were a Soviet commander, I'd take the evacuation every time. I can go through that in detail but I'm not going to. I may do that this afternoon.

Let me make one more comment, and I know I'm preaching to the converted. I think the biggest single difference between Soviet planning and American planning is that the Soviets think of war as an experience, and that after the war's over there will be a postwar world, and they're interested in this postwar world. And you are too. But you just happened to say, "If and when the war ends," and I want to specifically nail you on that just for the fun of it. All wars end, and we should think in terms of the ending of the war.

**Scowcroft.** I didn't mean to put it in that sense. What I meant to say is that our inclination for so many years has been to say: if we can't deter a war, we're going to have this spasmodic, 12-hour, 24-hour attack, and then it's all over. And what I'm trying to do is say that that is the most unlikely way a war would end, and that the most stressful thing in terms of communications comes after this spasmodic phase — how you enable the President to continue with the conflict, reconstruct his society or keep it going, and try to end the war as soon as possible in some kind of communication with the enemy. We've given almost no thought to that except in recent times. That was the point.

**Kahn.** I know, Brent, that you've thought of these issues more than almost anybody, but I couldn't resist getting the point out.

**Question.** As I'm somewhat of an outsider to this, this may be a dumb observation. But 20 years ago today, or 20 years ago this month, I was reading Dr. Kahn's *On Nuclear War*, and it seems as if an awful lot of those same issues were pretty well laid out there, including all these decapitation scenarios, for example, and how does one worry about terminating a war after a postattack phase or whatever. Is it naive to ask, "What's been happening for 20 years that these issues are still so lively?"

**Scowcroft.** No, I don't think it's naive at all. The circumstances have changed very greatly and while Herman's book was a seminal work, not everybody read it and believed it. There is, I think, a great reluctance in the United States to look seriously at and debate these kinds of issues. They are so horrible that we have taken refuge in the assured destruction mentality. It's not so much that our forces have been targeted that way, but the view that what we've got to do is prevent a war, and if it happens it will be so horrible that we can't do anything to get through it. Herman made a very fine point: the Soviets do not think of it in that way. Whether or not they have a war-winning philosophy, they're inclined to look at strategic nuclear war as war, and at a nuclear weapon as another weapon, albeit large and horrible and so on, but still dedicated to the same kinds of things. So they tend to look for continuity through a conflict and we have not, for whatever reason. At the outset of the nuclear age there was a little book by Bernard Brody, *The Absolute Weapon*, the message of which was that there had been a discontinuity in warfare — an entirely new way of thinking. Now we're gradually coming around to realizing we've got to do more thinking than we have, especially in the C<sup>3</sup> area.

## **Maj. Gen. Winston D. Powers, USAF**

### **Deputy Chief of Staff**

### **Communications, Electronics and Computer Resources**

### **NORAD — Aerospace Defense Command**

**A** very interesting question was asked a little earlier, "What's happened in the last 20 years?" That's probably a capstone for lessons learned in what I call the tactical warning/attack assessment business. We have a heck of a lot to learn from the last 20 years. If I were to give you another title, it would be "unambiguous warning." That's what I've lived with for the last three years or so — unambiguous warning, which would allow the National Command Authority to carry out its decision-making responsibilities.

What brought this into prominence? Well, when you look at the tactical warning and attack assessment system, you're looking at a system that grew over a period of 20 years. It became a system of systems. I won't overeducate you with the systems I'm talking about but we start with the ballistic missile early warning systems — heavy radar systems up north. We graduate to the infrared systems. We add capabilities with PAVE PAWS sites.

But as these many systems came on line, we didn't automatically upgrade, or reconfigure our command centers. They developed at their own pace. So when I got to NORAD I found that we had a problem.

We started to work on the problem and lo and behold on 9 November 1979 the system worked as it should. A tape got on the system and with a false alarm created the kind of publicity you don't want a system to have in its infancy days, though it did catch the attention of a lot of people — unintentionally, of course. And I suddenly got some help at NORAD.

People say, "What is this warning business? Why do the airplanes take off? Why do they start the engines?" We were able to explain it to them. They made some notes. Now, as things would have it — this was unintentional again — we had another alarm on the third of June 1980. That's when I really got some help. And I mean help in the true generic sense. People became more sensitized to

this business of unambiguous warning and the requirement to take a look at a system of systems, how it was put together, how it was managed, who was responsible for it. And when I talk about help, the help came from Congress. It came from OSD. It came from the Air Staff, and it came from my good friend on the right, General Dickinson. We took an in-depth look. It was clear that some organization had to be created to take a look at the system as it evolved; fix the past, work on the present, work on the future, and at the same time, keep the systems on the air, keep the command centers tied together, keep the computers tied together, and do everything in orderly fashion. I think that's when my hair turned gray. So we established what was called a System Integration Office.

What is the job of the System Integration Office or SIO? It is headed up by me, and I'm supervised by General Hartinger, CINCNORAD, in his role as executive manager of the TW/AA system. The job of the SIO is to look at the tactical warning/attack assessment system from the sensor to the computers, to the communications, to Cheyenne Mountain, out of Cheyenne Mountain, through the computers, through the communications, to each of the principal command centers. We're talking about the SAC Command Post, the alternate National Military Command Center, the National Military Command Center, and of course 17 other command centers involved in getting this data. The SIO must assure that this complex system provides unambiguous warning and timely accurate data.

We got on a rather fast train. The Chief of Staff assigned the SIO responsibilities to NORAD in October of 1980. Because of the heat behind the program and the requirement to do these things, we were manned in less than six months (unheard of in Air Force annals). Manned with very sharp blue suit personnel with additional capability for contracting technical engineering support capabilities. We expect to have that particular part of the organization completed by November 1981.

What is a system engineer's responsibility? One, to produce a document called the TW/AA Architecture — Tactical Warning and Attack Assessment System Architecture. It tells how we are configured now, what the interim improvements are and where we want to be by 1986 and into the late 1980s. It was no small task. The document has been produced and is on the street as of about two weeks ago and it covers the A to Z of TW/AA.

While doing the architecture, we ran into the question, "What has happened in the last 20 years?"

A lot of good efforts but not really tied together. We explain that in the architecture, and discuss how we intend to tie it together.

We were then asked to put together a system reference. In 20 years no one had tied together the TW/AA system in any kind of a reference document without going through 17 different libraries in 17 different locations to find out what this system was. That's now on the street. We've also put together what we call the top-level drawing for top-level managers who can actually look at one drawing and say, "When this bit of data comes out of the BMEWS site at Fylingdales, it goes here and does this."

In addition to my job as the chief of the System Integration Office, I'm also Deputy Chief of Staff of Electronics and Computer Resources KR J6 for NORAD. That means that in one organization in the Air Force the computers and the communications are all under one hat and that gives me the latitude to use my other hat as System Integration Office chief to do the technical things necessary for tactical warning/attack assessment systems. Now we plan to be able to do the kinds of things that General Scowcroft wants — tie together this system to give us credible warning, unambiguous warning, timely accurate data.

Now very briefly, how am I organized to do this? We have about 90 people assigned to the System Integration Office. The center of the organization is blue suit. We have an architecture division — Architecture Directorate. And its job is to plot how we will proceed with the TW/AA business.

We are concerned about that because we learned from the past events. Each part of a TW/AA system — command centers, computers, communications and sensors — each and every part will be touched in some technical fashion in 1982. Someone has to look at that and keep it cohesively tied together. We can't afford to take down the command centers for three or four weeks to put in a new computer. We can't afford to take the sensor down to add refurbishment. We can't afford to take down a communication link and put in another link. We've got to find a very careful, unambiguous way to do that kind of integration.

We also have what is known as an Interface Engineering Directorate. How important is this? Well, I'll give you a dollar for every accurate interface control drawing you can find on the BMEWS system that goes back to 1960 and makes sense. Over a period of 20-some years, we've changed portions of the system from one period to the next with some

disregard for the effect on the total system. The job of the Interface Engineering Directorate is to get that particular house in order and we've already stepped out on that. I might add, not to pat MITRE on the back, but they are a vital, extremely vital, part of this effort.

To ensure that the system evolves, to ensure that we have the right kind of continuity, we've also established a Test and Demonstration Directorate. What's its job? I am the chief tester because every time there's a software change, every time there's a hardware change, someone from Colorado Springs goes out and physically checks that change against the baseline document. Every time we make a software change

that changes the data — that changes the command decision displays — I review it. Then we test it before we allow it to become operational. Some of these tests last as long as six to eight hours.

How does a general, or generals, watch a specific technical test? Well, I put on a headphone, a piece of plastic in my ear and I talk to all of the command centers at one time. That precludes us from having another 9 November incident as we test the system. I call each of the command centers. I talk to each command post operator and tell him, "Hey, this is me and we're running a test. If you have a problem, you call me back." Everyone recognizes and acknowledges that kind of an effort. And that's how we do the tests, plus detailed technical analysis.

If there's going to be a change in hardware, we have the license, approved by the Air Staff, the Chief of Staff, verified by JCS to take a look at the technical flow of data in that box. We found some very strange things in the tactical warning/attack assessment system. We found that some command centers were having the information relayed to somewhere other than the command center. We've managed to change that, I assure you.

Probably the most sensitive part of this integration business is configuration control, keeping the handle on how we do it, keeping the lid on the technical changes that go on day by day. And with that we have established a Configuration Control

Directorate. And its job is to maintain that baseline document.

Again we've gotten significant help from The MITRE Corporation in organizing writing, and in the way of technical expertise.

If this is not enough, we've ensured that the most

**Probably the most sensitive part of this configuration business is configuration control, keeping the lid on the technical changes that go on day by day.**

critical decisions involving the tactical warning/attack assessment system — and that includes the sensors, the computers, the operation, and the maintenance — are brought to general-officer-level attention as soon as the problem arises. Who are members of that august body? We have Tim Patton from OJCS. We've got Truman Spangrud from ESD. We've got the vice commander of Communications Command. We've

got General Tidwell from Sacramento ALC. We even have a NORAD general officer on the panel. We have assistance from the C'S Directorate under General Dickinson. Pat Halloran is assigned to that organization. We have a SAC general — a SAC deputy DO — assigned to the organization. As things would have it, I am the Chairman. We originally called the group a Steering Group. We now call it an Advisory Group.

And those principal kinds of things: scheduling, money, assistance, operation and maintenance are brought to the general officer level as soon as the crisis or situation cannot be resolved by the captains and the majors. So from time of inception to time of implementation, things now happen in days rather than months or years. We intend to put this system in a configuration so that, as required by the National Command Authority, it gives us unambiguous warning, timely warning, credible data. And that includes the principal systems of today, the systems that are coming on line tomorrow and those of the future. I promised General Dickinson that I wouldn't give you a lecture on strategic warning systems. You all know what they are, and I'd like to end here and field any questions that you may have regarding NORAD or Aerospace Defense Command, Aerospace Defense Center.

**Question.** General, could you tell us how the revolution has affected the two major parts of the

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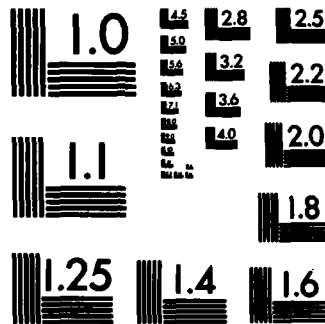
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requirements of early warning and attack assessment? I have the impression after these false warnings that the two systems have become pretty much interlocked, so that the more complicated attack assessment has fouled up some of the early warning which is a simpler task. Could you say something about that?

**Powers.** Let me put it this way: regardless of what you read in the newspapers, 9 November 1979 was not a computer problem. An operator hung a tape on the system and didn't know the proper system configuration and the computer did just as it should. On the 3 and 6 June 1980 incidents, we had a chip malfunction in a piece of communications gear in the front end of the computer system. When the data got to the various command centers, it was only a matter of minutes before the command post operators determined that the data was false. And the actions that they took were just preliminary actions that do not, as envisioned in the newspapers, immediately precede the holocaust. So we knew in the first two minutes that we had something wrong with the system.

I guess the question is, "What are we doing about that?" Well, we've done a lot about that. We've just let a contract to provide a missile warning bypass system that would take that data stream out of the communication multiplexer which is single point failure, and bring it back to the computers. That gives us three redundant paths in that system. We've replaced the front end communications processors — updated them; we finished that project about 30 days ago. Now we're coordinating software releases from Cheyenne Mountain with all the distant command centers and that is as tight a program as we can make it. And we've also established a TW/AA school for senior O6s and general officers. The general officers who want to know how to determine when that data is good or bad can go to school at Peterson Air Force Base to educate themselves. We have added significant error detection and monitoring schemes to the computers.

**Kahn.** I have two questions which may be unfair. Just say so if you think so. Obviously in the warning system it's easy to think of you producing the warning and other people producing the reaction and somebody said the Joint Chiefs are somewhere in between. But in fact, when we look at the issue, we think in terms of "warning and reaction." Sufficient warning to turn on the motors of a plane is different from enough warning to take off, is different from the warning required to launch a strike, and so on. I think it is very important to

think of "warning and reaction" as a unit. I was a little disturbed by your emphasis on unambiguous warning. I wonder if it's a different warning that determines whether you hit cities, or you hit missiles and so on. I assume the Joint Chiefs spend a lot of time with that, but is there anybody over in your organization who's looking at reaction as well as warning?

**Powers.** There are two parts to the equation. The first is warning, getting the data in and, secondly, someone has to make an attack assessment, determine whether the North American continent or portions of DOD or our allies are under attack. At NORAD that's done 100 percent of the time by CINCNORAD himself. He made that attack assessment last year a little over 500 times. Why does he do it? Because he's got more information than any other command center. He's got intelligence people. He's got people who know how sensors operate. He's got people who know how the system operates. And he is the one who provides that second part of the equation, the attack assessment, to the National Command Authority.

**Question.** Probably one of your weakest links and maybe biggest problems in the warning system is the communication system. Some of your communication does flow through the commercial networks which are soft and vulnerable. Does your architecture address the end-to-end flow of the data from the sensors to NORAD out to the users, and does it consider fixes to that vulnerable communications system?

**Powers.** Yes, the architecture does look at it from end to end. As I said earlier, it looks at the sensors, the communications, and the computers. We go from what the system looks like today, what it will look like in 1985 to what it will look like in 1990. Included in today's architecture is a description of the TW/AA system based on all those things planned by the various joint agencies that we don't have the money for right now, like the jam-resistant secure communications, like DSCS III, laser communications, fiber optic systems, proliferated low-frequency and HF systems. All those are included as part of the connectivity side and we are working closely with Admiral Paul Tomb and his staff on that connectivity portion. If you want to put this whole thing together, everybody must put his share of dollars in the pot. That's what's going to make it fly. But to answer your question, the architecture does that.

**Question.** I have two questions. One concerns the pre-nuclear environment, the other a nuclear

environment. A Congressional report on false alerts raised the issue not only on the June and the other high-level false alerts but the low-level glitches in the system — some 3,000-odd very common glitches — apparently every month. I wonder if you could address yourself to what we're doing about those glitches, if we can do anything? The other question is: How survivable, in your estimation, is NORAD in a nuclear environment — Cheyenne Mountain itself?

**Powers.** Let me answer the last question first. There is data that tells what that survivability factor is, but I can't discuss it at this particular time. We do have classified data, describing how hard the Mountain is, depending on various scenarios, megatonnage, impact points, those kinds of things. One of the things we're doing is building what we call a 'backup facility' in the Colorado Springs area. That's so that if the Mountain is out, the CINC will have the capability to, at least, give an attack assessment. A lot of people say, "well, what are you doing putting it in Colorado Springs? Why isn't it in New York?" Well, if the CINC is sleeping at two o'clock in the morning, there's no way he's going to get from Colorado Springs to New York to do that attack assessment. He's got two, two-and-a-half to three minutes to get from his quarters to his command center and make the assessment. So that's what we're doing in that regard.

As far as the other anomalies: that's true, there are a few. Radars are affected by ducting. Infrared satellites experience various other kinds of problems due to the atmosphere and due to solar effects. But that's why we at NORAD, when we make that attack assessment, take all those things into account. And that's the job of the staff that supports CINC NORAD.

**Question.** General, I get bothered by the notion that we can even expect to assess an attack to any useful extent. We might be grossly misleading ourselves trying to do something which may very well be impossible. From a Soviet perspective, it strikes me that preplanning could well extend through two waves, or say, seven or eight hours of an initial attack. How might they approach it? Besides trying to take out the command and control, I would expect them to try to grossly mislead our efforts to assess an attack. Is it a reasonable expectation to assess something prior to the landing or waves of missiles during the first day? How do we take account of Soviet deception and various ways of attack and preplanning in trying to assess an attack? Can we do it?

**Powers.** You know, if I give a "yes" or "no" answer to that question I get in trouble, and if I give you a "maybe" I sound dumb. I really don't know the true answer to a question of that sort. We can only do the best we can with the tools we've got. We can do a better job if those things funded in the President's budget on C<sup>3</sup> become a reality.

**Question.** Can you give us an indication of the time budget for the various stages of attack assessment from the first indications of something funny happening to the time that it gets to the NCA?

**Powers.** That's commonly referred to as the time line and basically that is classified. But, generically, the NORAD portion is that first two or three minutes to give warning, with the tail end of that being an attack assessment. From there it goes to the National Command Authority who acts on the attack assessment information given to him by CINC NORAD.

## Rear Adm. Paul D. Tomb, USN

Vice Director  
Joint Strategic Connectivity Staff

**D**ickinson. As we began to concentrate on the system approach to improving our overall connectivity, it became apparent that we would benefit greatly from having a full time group outside of Washington that could devote itself to the problem — the architecture, the procedures involved, and the way the procedures are executed in various command centers and throughout the system. Therefore, a little over a year ago, the Joint Strategic Connectivity Staff was organized. Its Director is one hat of CINCSAC, but the Deputy Director has the full time responsibilities. That is Admiral Paul Tomb. His assistance to the Joint Chiefs of Staff, for whom the Connectivity Staff works, has been invaluable in addressing the problem of improving C<sup>3</sup> connectivity and system operation for the nuclear forces.

**Tomb.** Yesterday, General Stansberry mentioned several vital strategic forces, and Admiral Catola mentioned the B-1 and the MX. I assure you I am also interested in the Trident submarine and

the Polaris-Poseidon missiles in all aspects of strategic connectivity, from the tactical warning/attack assessment stage that General Powers addressed, to feeding that information to the NCA, which General Scowcroft addressed, to giving that information back to the CINCs, to getting it out to the men and women who carry out the mission. We've talked about scenarios before this and I assure you that my favorite scenario is peace; I am here to make sure that deterrence works. If it doesn't work, then we can do our jobs as military people. But I know of no military man who wants to go to war.

I'm not a communicator by trade; I'm an operator. The Joint Strategic Connectivity Staff ensures operator input to the connectivity problem, to help make sure that operators can carry out their mission reliably and effectively. And that includes both delivering and not delivering a weapon.

The Joint Strategic Connectivity Staff is composed of 22 people: 20 work for me, I'm the 21st,

and I work for the 22nd. My boss is General Bennie Davis, who is CINCSAC. It's a small organization: 13 officers, 5 enlisted men, and 4 civilians. We have an Operations section, a Systems section, and an Analysis section.

The Operations section goes out to see how the different command centers operate their equipment, what the procedures are, what facilities they have, what the operator errors are, how we can help operators do a better job. The Systems section (I call them the communicators) look at how we can best establish the connectivity links necessary to our mission. The Analysis section looks at improvements suggested either by us or by the unified, specified commanders to see how they will affect connectivity.

We then make a recommendation to the chairman of the Joint Chiefs, General Jones. General Davis, CINCSAC, works directly for General Jones in this role, and we have a very short response exchange. When General Jones wants something, he usually tells General Davis or General Dalton, the Director of the Joint Staff, or he may call General Dickinson. Somehow we get tasking, often by phone, hopefully by written transmission of some sort, and we get on with the problem. I work very closely with General Powers. I attend the Advisory Group meetings in Colorado Springs and we work closely with the TW/AA section of the connectivity issue. Generally speaking, the overall strategic command, control and communications requirements are set up in Presidential Directive 53.

*A survivable communications system is a necessary component of our deterrent posture for defense. In support of national security policy, the nation's telecommunications must provide for connectivity between the National Command Authority and strategic and other appropriate forces to support flexible execution of retaliatory strikes during and after an enemy attack.*

With this directive as a starting point, the first question that should be addressed is "What constitutes strategic connectivity?" Let me give you the explanation we use at Offutt Air Force Base, which has been pretty well accepted throughout the Department of Defense (see Figure 1).

The lead element is Attack Detection, which includes warning, intelligence, and reconnaissance. Attack Detection starts the process. Satellites and ground-based radars must provide detailed,

unambiguous warning information and provide it quickly and accurately.

Next is the Attack Characterization or Attack Assessment. After receiving the detection inputs, the North American Defense Command Missile Warning Center must analyze the attack to provide the National Command Authority (NCA) with both warning and assessment information. Of course, we're vitally interested in the warning aspect first, the attack assessment information second. We would like to know when we are under attack primarily, and then secondly, where that attack has been directed, if we can detect it or determine it.

Whether the warning time provided by NORAD is adequate depends on circumstances not entirely under U.S. control. For example, one factor is the proximity of the Russian submarines to our Atlantic Coast. The time of flight of missiles from those submarines is less than 15 minutes from break-water to impact on the Washington D.C. area. So we have some concern about how much reaction time we have. The short SLBM flight times also affect the length of time available for the third element of connectivity — the decision-making process that General Scowcroft referred to. Time could be very short. He referred to less than 10 minutes. Obviously, it's less than 10 minutes if the time of flight is less than 15 minutes because you must detect the launch of the missile, analyze that information, relay the information back to the National Command Authority through the connectivity links, and then give him some time to make a decision. If, in fact, the National Command Center is under attack, you must do all of that before the Center itself is destroyed.

Attack Assessment information must be weighed, attack and response options evaluated,

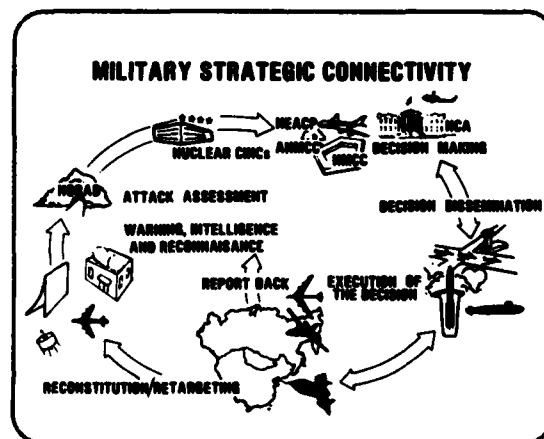


Figure 1

and the correct decisions made. Then we become concerned with the fourth element of strategic connectivity: an emergency action message must be formatted and disseminated. We must format what the President, the NCA, says into an action message to go out to the operating Commanders-in-Chief, the war-fighting commanders, who can then relay that information back to the operating forces — the pilot in the bomber, the man in the missile silo or the skipper of the Polaris-Poseidon Trident submarine. So the key links in this fourth element are the numerous components of the National Military Command System, including the nuclear CINCs and their Command Posts, both static and airborne.

The fifth element is the execution of the National Command Authority's decision. Here responsiveness is critical. Unless all elements of our nuclear Triad receive the message prior to impact of Soviet reentry vehicles (RVs) we risk losing large segments of our retaliatory forces. Systems such as the Joint Chiefs Alerting Network, the JCSAN, the Improved Emergency Message Automatic Transmission System, the IEMATS, the Air Force (Satellite Communications System, the Emergency Rocket) Communications System (ERCS), and the ground and airborne LF/VLF systems, among others, currently provide the connectivity to our forces.

Once initial execution is complete, we must have sufficient feedback data (the sixth element of strategic connectivity) to evaluate not only the effects of our retaliatory attack on the enemy but also our own ability to continue the war. Satellite reconnaissance missions, reconnaissance vehicles, and supporting communications will be needed to fulfill this sixth requirement of connectivity.

Finally (the seventh element), we need communications in the trans- and postattack period to reconstitute our national assets, (including surviving forces), to redistribute our resources, to retarget, and to replan the use of our forces as required. This complicated cycle is then repeated until hostilities are terminated. We believe this strategic connectivity concept provides the national command

authorities with a closed-door capability to manage forces during a conflict.

But to do this, the C<sup>3</sup>I network must be survivable, enduring and, in many cases, two-way. Warning, intelligence and force status information must be continuously provided to the nuclear CINCs and

to the NCA. The multitude of facilities, systems and procedures required to support this strategic connectivity network is complicated and costly. Today it does not possess all the qualities that would be needed to support the NCA or the CINCs in a nuclear war so they could ensure survival of their forces or provide direction and control.

The system is outstanding in a peacetime environment. We use it

often. It's reliable, dedicated and fast, very responsive. In wartime and under stress conditions, there are certain aspects we have to work on.

For the C<sup>3</sup>I systems to effectively support the objectives of the United States, they must have several qualities. These qualities are: survivability, endurance, flexibility, responsiveness, and credibility. Maybe we could add some others or modify the wording a bit, but those are the qualities we need. When designing and building a system, we try to maximize these qualities within the bounds of technology. We often find that these qualities conflict with one another.

Survivability means that the functions provided by the system will remain after facing any threat: nuclear attack, thunderstorms or whatever. That system has to work. Several systems support each function and our survivability should be centered around the function rather than any specific system.

Endurance means that the function must continue throughout all phases of a conflict. If a conflict occurs we need endurance through the transattack and into the postattack period. We must provide our decision makers with the capability to understand what is happening to our nation, and give them the capability to respond accordingly. Endurance applies to all seven areas of the strategic network I discussed earlier.

**C<sup>3</sup>I Systems must  
have several qualities:  
survivability,  
endurance,  
flexibility,  
responsiveness,  
and credibility.**

Flexibility is probably the hardest quality to achieve. The C<sup>3</sup> system must be able to respond to a wide range of operations. Often the requirements of one mission affect the ability to perform another. So decisions must be made based on investment versus desired flexibility. Flexibility is the area where system developments tend to get gold plated. It is hard for the person stating the requirements to know exactly where this threshold lies when the technical world continues to push for one piece of equipment that does everything. There is always some capability available just over the next hill, just beyond the next dollar, just one month away, if we could only wait. But waiting tends to drive the cost into the nonaffordable arena, or the availability into an outyear. Notwithstanding, our C<sup>3</sup> systems must possess flexibility.

Systems must be responsive, or available for use when required. They must accomplish their designed mission. General Powers was asked a question about time lines — the C<sup>3</sup> systems must deliver warning information to the National Command Authority as rapidly as possible, since that information will be used in the evaluation process to reach a momentous decision in a matter of minutes. It must be absolutely accurate. Here again we see a conflict. When building responsiveness into our systems, we have a difficult time integrating all the desired qualities because high speed, computer-generated information is vulnerable to almost all aspects of a dedicated attack.

This leads directly to the last quality that I will discuss: credibility. Whatever our C<sup>3</sup> systems look like, however they function or whatever media they use, they must have credibility to the user, to our enemies and potential enemies. The NCA and its commanders, at all levels, must be able to believe the data that our systems produce. Ambiguous or false information quickly renders a system nonfunctional and places an unholy burden on the decision maker as to credibility of the information.

The enemy must know the credibility of our system is absolute. If the C<sup>3</sup> system is to be the key element for deterrence, as I think President Reagan recognized in his speech of 2 October 1981, it must be survivable, endurable, flexible, responsive, and credible. I issue all of you a challenge to help our nation develop the strongest connectivity network possible.

**Question.** Admiral, you said that unless weapons systems receive their instructions before enemy warheads strike, we risk losing a large fraction of our retaliatory forces, and later you said that a

momentous decision would have to be reached in a matter of minutes. This means launch under attack really, doesn't it? Is our system really that vulnerable?

**Tomb.** One of the major legs of our Triad is our bomber force and we have to get the bomber force airborne for it to survive.

**Question continued.** I see, so you're really referring to the bombers.

**Tomb.** Yes sir.

**Teller.** I am pretty sure that I'm not allowed to ask the question.

**Tomb.** This is still a free society, Dr. Teller.

**Teller.** Not necessarily — I refer to the limitations imposed on all of us by security. If I may make a little speech: it is really intolerable that security prohibits us from communicating with each other about things we are absolutely sure the Soviets already know. Why that is security is not clear to me. Could you remark on a question that to me seems extremely important: "What is the optimal way to communicate with the submarines?"

**Tomb.** Submarines at sea?

**Teller.** Submarines under the sea!

**Tomb.** It has to be a network. It can't be a system.

**Teller.** Which do you prefer, if any?

**Tomb.** Under what scenario?

**Teller.** We are attacked and we want to tell the submarines what to do. I would prefer to not just tell the submarines "Shoot." I would also like to tell them whatever we know at the moment about Soviet submarines or any other pertinent data. How, in an emergency, do we communicate with all worldwide deployed submarines?

**Tomb.** One way is the extremely low-frequency (ELF) capability. That is not a good message transmission vehicle, but it is a very good bell ringer like the JCSAN, the Joint Alerting Network. The way ELF operates is to send out a continuous signal, always transmitting a message. Any loss of that signal will, in fact, be a message saying, "Change your communications status. Try another route to copy a message." Obviously, if we are disseminating some type of hostility message, we would try to get it out on the ELF system. We would try to transmit it, but the data rate is very slow. So the only way you would not get that message out on ELF is if the ELF station were annihilated, wiped out. The loss of that message would tell the submarine commander that he must try another method.

The next most reliable method would be the VLF, which is either wire, underwater loop, or a buoy. Those three antennas could be used to try to send

the information on a VLF system. If that doesn't work, the sub would have to come to the surface. The commander would not surface the submarine; he would put an antenna out above the surface and communicate via the FLTSAT, SSIXS satellite, which is the Submarine Systems Intelligence Exchange System.

The commander would also try HF. Ships at sea copy all broadcasts. Once they get a war message, an increased hostilities message or increased DEFCON status, they transmit this message by high frequency. The submarine would come near the surface, extend one of its radio antennas, and copy the HF message. That mobile HF relay system has been tested in the Atlantic Fleet under Admiral Train and has been very effective. Downstream, we will have EHF on our submarines. That is essentially what the submarine would use. Does that answer your question, Doctor Teller?

**Teller.** I would have liked you to go even further but I might try to talk to you privately.

**Tomb.** All right, be glad to.

**Question.** Admiral, regarding the seven elements of strategic connectivity, General Powers' problem with the tactical warning and assessment module of the system seems to lend itself to technological solution, the integration of sensors, and so on. That information is then fused and transmitted to the rest of the system. Going back to what General Scowcroft said, we're transmitting a great deal of information from that warning module and a great number of judgments must be made. He caused me some concern when he said that an important ingredient is the dispersed, prioritized, decision-making module of the various command posts — the airborne command post and others. Where will the decision be made? There tends to be this lack of willingness on the part of the Executive branch, or the NCA, to find out whether the operational responsiveness is correct under various scenarios. Could you describe what we're doing to respond to the problem that General Scowcroft referred to?

**Tomb.** I can't describe what is going on in the White House but I can describe what we are doing.

General Dickinson alluded to the hardening of the E-4B National Emergency Airborne Command Post (NEACP; pronounced kneecap). He also mentioned getting a large fleet of them. I take one exception to what General Scowcroft said. He said "with the NCA on NEACP." There are two very

critical assets that must exist for us to wage a war or respond effectively to a war threat: the NEACP and the NCA. But they don't necessarily have to be in the same vehicle. They have to be in communication with each other so that the NCA can utilize the NEACP as the platform from which he transmits information and orders, and through which he receives information back. The NEACP can perform that mission very well.

**Comment.** I do think there is dedication in this Administration to do better in the exercise area.

**Comment.** Well, after all, the purpose of this whole network is to extend the reach of the President's nervous system — the synapses, the decision-making process in his brain — to the assets available. Improved C<sup>3</sup>I will allow him to do that quicker and more reliably and will minimize the judgment factor based on unknowns.

**Tomb.** We'll never minimize the judgment factor. We can, however, provide more information on which to base a judgment.

**Comment.** I would like to make one additional comment on this subject, so that there is no misunderstanding by those who are not familiar with this system. Computers do not make decisions in this system. Computers sometimes assist people to rapidly process some of their information, but every bit of that information is checked back by voice, very fast, in secure voice communications, from the sensor to the NORAD command post to the decision maker, and so on. Very definitely, the prime method of going around that loop is still by voice communications. It is not computers talking to computers.

**Tomb.** Man will commit our country to whatever we do; computers won't.

**Question.** Sir, regarding your six C<sup>3</sup> qualities: I don't know who could disagree with them, but

**Man will  
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can we assign quantitative numbers to them? How hard is hard — 15 psi, 30W per square centimeter? What is credible? Can we define that to the point where we can write a set of specifications, give them to a contractor and let him build that system without paying out our total gross national product?

**Tomb.** The Defense Nuclear Agency is considering that. About two months ago they withdrew their paper that provided hard figures on that. It made our job a little harder. I don't think we can choose between a probability of one or zero regarding connectivity in the context of our national survival. It must be one. But it doesn't have to be a one on every system. You must ensure that tactical warning data gets to the NCA, whether by landline, satellite, hardwire, or motorcycle; it has to get there and it has to be reliable, rapid, and credible, and we must have the flexibility to use it. So, to answer your question: no, I can't give you a number, but the Defense Nuclear Agency is working on that now and I hope they will come up with a number. And "hard", as you know, refers not only to resistance to blast damage but also to EMP (electromagnetic pulse) effects, high altitude bursts, sabotage — all manner of threats to our fragile systems. All of those must be addressed.

My staff is working very closely with AT&T and ITT. When they start working on long lines they tell us what they are working on and what they are designing that system to do. That allows us to comment on whether this or that particular switching gear, landline, or mode of connectivity is hard enough to meet the needs we can project for the near future.

**Question.** Admiral, I notice that your slide is labeled "Military Strategic Connectivity." Earlier today we discussed the possible situation wherein an evolving crisis may be of strategic importance

to the United States, but which would not involve our main strategic systems. To what extent does your office worry about communications needs in an ever-tightening crisis situation for which it is not yet appropriate to use our strategic forces?

**Tomb.** We're extremely concerned about it. One of our survivable links in strategic connectivity is the airborne link, since it is mobile, airborne, and uses aircraft-to-aircraft UHF capability. As you stress the system, the tensions rise. At a certain DEFCON posture you get those birds airborne. Those planes have only 8 to 10 hours of fuel aboard. Then you have to bring them down or refuel them in the air. Once the line is broken, there are problems in transcontinental connectivity.

**Powers.** If a crisis arose in which the rapid deployment force needed to be used, would any of the communications and connectivity cycle be involved in using those forces?

**Tomb.** Offhand, I'd say no, but General Dickinson can address that better. I'm strictly in the strategic arena. I'm not in the tactical theater.

**Dickinson.** Strategic nuclear, I think is the word, and not the theater and tactical systems. My office handles both of those. I have two deputies. One on the theater and tactical side, the other on the strategic, intercontinental nuclear side. For most purposes, they are basically separate systems. The strategic side discussed here today has to function in a few minutes with high reliability and so on, but does not have many of the complications that theater and tactical have. That's a whole other subject in command, control and communications systems.



## Session III

### Question and Answer Period

**C**omment. I'm with the National Communications Systems staff. I've listened to the symposium for a day and a half now, and when we talk about C<sup>3</sup> — at least here, and generally in the community as well — we tend to talk about the strategic connectivity problem, the NCA connectivity problem, and the strategic forces. Very seldom do we talk about the problem of connectivity to conventional forces, which is just as real a problem in nuclear warfare. Whenever you start addressing the problems of how the President does his other jobs, it even gets a little shakier — in fact, sometimes we don't even discuss it at all; and that's been the case here, except for happenstance. As I view our future architectural and C<sup>3</sup> problems, the problem of dealing with all the aspects of the communications has tremendous scope.

There are architectures underway in the NORAD

arena; there are architectures that Admiral Tomb is working on. Architectures are also being worked on by the Federal Emergency Management Agency, the intelligence community, GSA — all designed to provide communications for various parts of the Federal Government. Look at the size of the problem: we have to come up with an endurable architecture to do all the functions to allow this country not only to get into a nuclear war but to win a nuclear war, and survive as a national entity. As I observe what's going on in the community, I really don't see a lot of activity taking place to pool all this together in some sort of endurable architecture that we can present to the Congress, which controls the funds, that would give our legislators an accurate picture of what our national requirements are. For the National Communications Systems staff, I would have to say that's our job; but we just started in the past 6 to 12 months to

look at it in a serious manner. The best way to do that job, whether at the national or a subordinate level, is in question. Someone has to come up with a solution. I look to this community to provide us with advice.

**Tomb.** I'm not doing any architecture study. I asked DCA and NCS to look at that last November, and I haven't gotten anything yet. In fact, I just cancelled a 1.2-million dollar study effort, because General Powers is doing one for the TW/AA effort and I need an architecture.

**Comment continued.** I understood that. That's why I made that reference. I assumed you were in charge and that they were working for you.

**Powers.** We've got Mr. Grimes coming next week from the NCS. We'll see what he wants to take on.

**Question.** I have a question for the Admiral. Let's assume that I am an SSBN commander who just had my bell rung, and I come up and begin getting a message, and after a minute or two the message is broken. I presume that something major is afoot, and that something is expected of me but I don't hear for a day or two. Am I to assume that there's just been a minor microchip glitch somewhere, or that everything has been blown to bits and that I should begin lining up Red Square? Can you assure me that I'm going to have some way of getting the proper information in time to do something?

**Tomb.** You mean you lost ELF? I don't understand how you got your bell rung to start with.

**Question continued.** Okay, the ELF lets me know that there's been a change, and you want to give me a longer message with very intricate directions. I've been getting that message through other means, and suddenly that message is broken up. I don't know whether it's just a problem with the system, or whether I'm to assume that everything has been blown to bits and that's why I'm not hearing from you. My question is, as a commander with some weapons at my disposal, how am I to determine which of those two problems it is when the stakes are so high?

**Tomb.** There is a procedure you go through. It's in your patrol order. Each missile submarine CO has a patrol order specifying what procedure he goes through; I can't go into it now. But it's a definite series of steps. If you've lost communications in this manner, you go to the next step, and the next, and so on until you can determine what action to take.

**Question continued.** But if I have no further communications, if all systems have failed, what is the end of all this? I mean, is there a point at which

I have to make a decision; do I go to Bali and repropagate? Is that it? I'm assuming that the system didn't survive — that all the C<sup>3</sup> systems have left me out there cold. I'm not hearing from anybody, and here I am 8,000 miles from Washington. Am I to assume that my basic systems have been blown up, or that there's just a minor glitch somewhere that will be fixed, and I'll be hearing from you soon?

**Tomb.** Are you driving at the question: Can the CO launch his missile when he gets ready?

**Question continued.** That too.

**Tomb.** No, he's not going to do that.

**Question.** I think my question is for CAZ. How much attention have the Soviets given to their strategic communication command system, and how would you evaluate it?

**Zraket.** Other panelists might want to comment on that. I would say, in general, I think they've given a lot of attention to it. It's a very good system.

**Dickinson.** They put a tremendous amount of resources into it. They have large numbers of exercises, with top levels involved. That's probably about all I can say.

**Question.** I'm a layman here. I wonder whether somebody up there could explain in a little more detail the difference between transattack (Phase II) and postattack (Phase III), and why the systems could survive Phase II but not Phase III.

**Dickinson.** Let's take the first half hour of the conflict. You can have early weapons from the SLBMs. They're limited in number and they come from the water areas and toward the center of a country. Later, after about 30 minutes, you can have ICBMs, bringing very widespread, very messy damage. In the period after that you begin to get fallout problems, but you also begin to have some time to reconstitute, if you have anything or anyone left to do it. Airborne assets, by their mobility (assuming they can get airborne), are fairly survivable during those early stages. At some point they obviously run low and need aerial refueling, and tankers have to pick up more fuel, and so on. That kind of endurance will last a few days at most. From that point on you have to take some other approach to the system, depending on how massive the damage is.

**Scowcroft.** I think one of the key points is that aircraft and satellites are survivable over varying periods, but probably not enduring. I think that's the fundamental difference.

**Tomb.** Being an old sailor, I'd say ships are pretty survivable. They keep talking about airborne assets and ground mobile — we are

looking at putting some capability on ships, not Navy ships particularly, but a ship that can travel inland waterways and the coastal waters. They can sustain the feeding, the maintenance, operator personnel, and still have the capability to communicate with the command forces. So it's not necessarily a submarine or a combat warship; it could be an old rusty Liberty ship that can use some of the waterways we have available. Its mobility makes it nontargetable per se, and you can have that capability readily available to the National Command Authority.

**Question.** There seems to be a great deal of speculation, some informed and some not so, about the effects on communications of a high yield atmospheric detonation. Lacking empirical knowledge, thank God, how sure can we be of the realistic consequences that are likely and that might have to be coped with?

**Zraket.** First, I think it's worth noting that the problem with satellites is somewhat different from the problem with aircraft, and both differ from the problem with ground-based electronic systems. It's very uncertain, I think, what's going to happen to ground systems. We have very little empirical data to go by, and the conjecture is that it's going to be very bad, so bad that we shouldn't worry about it. I think the only answer here is that we've got to go to more surface-mobile and air-mobile systems that are small enough that we can shield them against such effects. We've also got to do a lot more testing, especially with respect to effects on satellites. I think there's a general feeling in the community that with the expenditure of lots of money one can design and shield these systems against EMP effects, but I also think there's a fear of that Pandora's box, because the bill may be too high. So it's a somewhat uncertain situation. I don't feel as pessimistic about it as a lot of other people do. I think that with a good test programming simulated EMP, modest expenditures of money and well designed C<sup>3</sup>I systems we could offset most of the problem, or at least the perception of the problem.

**Comment.** A follow-on to that last comment on HEMP. That's an issue that's been looked at pretty hard at the national level. I think it's fair to say that the President's scientific advisor, Director of OSDP, is taking that on this year as a priority project, to examine the whole issue of that particular threat and get some consensus in the national scientific community out of which we can develop a strategy to treat the threat after we better define it.

**Dickinson.** So that there is no misunderstanding, you are not speaking in the context of the threat to the DOD system. There is no question about that in the knowledgeable community's mind. You are speaking of the threat to the national communications system, the Bell system and so on.

**Question.** The MX MPS concept was basically derived, I believe, to provide survivability. With the President's decision to base the MX in silos, apparently much of that survivability would be reduced. Taking this, along with the President's decision to improve command and control systems, I'm wondering if there's an underlying decision here to support the concept of launch under warning?

**Scowcroft.** I wouldn't come to that conclusion at all. There may be many things behind this particular MX decision. I think there is no indication however that a launch-under-warning theory is behind it.

**Zraket.** The analyses show it's really not a very desirable course of action. Besides all the dangers of overdoing it, even the efficiency of force use may not be well served by such precipitous actions. I've never found any strong sympathy for launch under warning from the perspective of force effectiveness among the people who have studied the problem in depth.

**Dickinson.** I'd like to conclude with just a very brief remark. I think the most important point I'd like to make about the command, control, communication, associated sensors and intelligence system, is that it is a system and it's a system problem, and I think that should be evident from the discussions today. It's got to be approached, fixed, and improved from that viewpoint. Secondly, I very strongly second the point Charlie (Zraket) made: that a reliable, hardened command, control, communications and intelligence system is the key to safety. It's the key to stabilization of crisis situations, and it's the key to deterrence. It's an absolute must from all those points of view because any potential enemy just simply must not believe that he could decapitate the system and have a cheap ride. We've got to have a capability that is absolutely convincing, so that there won't be that opportunity. To that end the session here, I hope, has been very useful. We'd certainly appreciate advice, assistance, suggestions. We don't have the answers, as Hank (Cooper) pointed out, to all the enduring problems for the longer haul. We need bright ideas. We need help. We need some of the kinds of thinking that have been evident in your questions.

# **Session IV**

## **Strategic Nuclear Policy Alternatives**

### **Introduction: Dr. John L. McLucas**

**President of COMSAT World Systems Division**

**W**e are dealing with difficult questions. We have gathered to find answers, to come to terms in some way with the various strategic possibilities that face us. In this session, we will examine strategic nuclear policy alternatives. My first thought on this issue was that we should be able to write down the alternatives, somehow prioritize them, and get on with it. But then I thought that perhaps there are infinite alternatives, or at least a large number. Some stand out in our minds. While some of these alternatives certainly deserve our attention, others equally valuable may get neglected.

One question we could deal with is whether the current administration's policy (if there is one) on the use of nuclear weapons should be kept as is or modified. Our first speaker is in a great position to deal with this kind of question. How much has policy changed since Mr. Reagan came to Washington? The man I refer to is Jasper Welch. He has all the academic credentials, awards and so on, that can be given to a bright young Air Force officer. He's had training as a nuclear specialist. He's worked for the Department of Defense, the Air Force, and the White House — all those places where people develop a wide range of backgrounds and interests. I think that, in his job as head of the Studies and Analysis activity in Washington, he has been exposed to as many issues and potential answers as anyone could be. Jasper, would you bring us up to date on where the administration stands with respect to some of these policy alternatives.

## **Maj. Gen. Jasper A. Welch, Jr., USAF**

**Assistant Deputy Chief of Staff  
Research, Development and Acquisition**

**I** have found, in some years of working in the area, that there are many points of view regarding what is generally called strategic nuclear policy. There is acquisition policy, which is concerned with what weapons and control systems one actually purchases and deploys. There is employment policy, which relates to the development of war plans and targeting plans and how forces might be operated. There is a heavy foreign policy involvement, because our defense is very tightly bound up in several alliances, both formal and informal. The principal one of these, NATO, is a nuclear-bearing alliance. Then there is human affairs policy, in which I would include both domestic politics (public affairs in the ordinary sense of the word) and something which the Carter administration more explicitly recognized: the moral force and ethical force of the United States in world affairs generally. Some would add

a fifth — arms control policy. You can slice it that way, but I think you would soon find that arms control, in a way, has roots and subsets in foreign affairs, military affairs and human affairs. So the catechism is a little obscure on that point.

At any rate, those many elements are involved. When some people talk about strategic nuclear policy, they are thinking primarily about acquisition policy, and a little less so about employment policy. The foreign policy aspects, in the United States, are normally completely overlooked. (That's not true worldwide, I might say.) The man on the street is, in fact, much more concerned about human affairs and how his government is thinking about human life.

The objective of all of this interest in strategic nuclear policy is to survive and prosper in a dangerous and uncertain world. Those of us who have lived in Camelot don't like to think it might end.

But it might. In fact, the leading indicators, if you will, when viewed against the broad sweep of history, would say that it very likely will end. It's only a question of when. So the question of surviving, and indeed even prospering in this dangerous and uncertain world has a lot of elements to it. There's a question of surviving in the long term and that of surviving in the short term. There's a question of surviving instant death and surviving what I would call lingering death due to economic disruption or economic starvation. We have to survive against powerful adversaries, and against weak adversaries who resort to such underhanded things as mass terrorism. We have to survive independently, as a nation, and collectively with the rest of the world. In the terms of the oath many in this room have taken: we must survive, against all enemies foreign and domestic. So that's the objective, and the challenge of that objective.

The history of nuclear policy starts before the nuclear era. It started in the late 1930s in the sleepy little town of Montgomery, Alabama, where the Air Force tactical school developed the notion of strategic bombardment by air as a new and powerful form of warfare that allowed one to attack an adversary's industrial centers without having to plow through his armies first. That was indeed a novel idea. They had a well developed theory and neither the numbers nor kinds of airplanes or munitions with which to carry out that theory, but that didn't daunt them. They invented "damage expectancy" in those days. They invented defense suppression. They invented all the trappings and paraphernalia, the CEPs and bias errors and all the stuff we think is all so new.

The next major events were the two important phases occurring during World War II: at the beginning, the decision to embark upon the nuclear weapons program, and then, at the end, the decision to employ them to end the war with Japan. The next five years were characterized, I would say, by a flirtation with nuclear abstinence. It's a not well known, not very open, not very secret secret, that,

in fact, we didn't have any nuclear weapons for the first years after World War II. That was followed by realization of the postwar geopolitical situation. We thought we had won the war for all times, and allies were friends, but we soon found out that wasn't true. Then came the era when we started, as

described by Herman Kahn with his marvelous phrase, "Thinking the unthinkable."

Then in the '60s there were three interwoven, disconnected, confounding and conflicting threads that ran simultaneously. There was McNamara's dilemma. On the one hand he was perfectly clear about the requirements for nuclear weapons and the flexible application thereof. He was also clear that he hadn't the foggiest idea

how to bound that requirement, and he didn't like that, so he went about inventing ways to bound the sufficiency of nuclear weapons. That rhetoric has led to no end of confusion about the matter. He described the adequacy of the arsenal in terms of a very modest task: a city-busting task.

The second thread involved the NATO alliance in nuclear planning in a more and more formal way and the revision of the NATO official doctrine and all that went with that. That matter, which was of great import to the Europeans, was hardly noticed in the United States except in the halls of policy in the State and Defense Departments. During that same period the practicalities of nuclear weapons employment finally got to people and the renowned and hallowed SIOP was born, the Single Integrated Operational Plan. If you've ever wondered why "single" is in there (not strategic, merely "single"), it has to do with the fact that we were having a warlord problem. Each Theater Commander-in-Chief had his own plan for attacking the Soviet Union with nuclear weapons. It occurred to a few people that it might be useful if they didn't all wind up at the same target at the same time. I'll come back to that point later.

The end of the '60s was dominated by what I would call the great intelligence gaps, of which there were at least two of some import. The first was the mistaken assumption that the Soviets were

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all this interest  
in strategic  
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and uncertain world.**

building an enormous active defense and were quite satisfied with their offensive forces. History has shown that just the opposite was true. The second, which occurred very early on, was the thinking that, if boosters that big were being built, they surely must be ICBMs — when they turned out, in fact, to be IRBMs. That precipitated a lot of mistakes. There were a number of other things like that, and there was a great deal of discord in the '60s because of the conflicting misinformation and bad information going about.

The next era in strategic policy was what I would call the era of arms control euphoria, which lasted from about '64 to '79 and can be broken into neat five-year segments. There were five years of getting started, and I date them from '64 because that was when President Johnson announced, if I may be allowed to paraphrase, "We could run and win an arms race, but I have decided rather to put that money in the Great Society and exercise restraint and to look for sympathetic vibrations from the Soviet Union in that restraint." After some hiccups with invasions of Czechoslovakia and the like we got started in '69, and from '69 to '74 there was great and, I think, very serious-minded progress in many ways, some real treaties and a great deal of enthusiasm. Then we spent '74 to '79 in an era of growing disenchantment and reawakened realism as to the great difficulties of dealing with another superpower in the same small world.

The next, and more obvious thing that happened in the '70s was that employment policy went public. The SIOP had been quite mysterious, and the fact that there might be policy statements which guided the development of the SIOP was even more mysterious and secretive. But in January '74, Schlesinger announced at a press conference, news even for the insiders, that the presidential decision with regard to a next round in the evolution of the SIOP policy had been made — and gave a ten-page explanation of it in his unclassified report to Congress. This policy was repeated by Secretary Brown in his January '80 report and again in the summer of '80 when PD-59 went public. So we entered a new era in public disclosure of employment policy.

Against that background I would characterize American strategic nuclear policy as having three main thrusts. First off, it has been very, very evolutionary. In fact, those of us who have been involved in working the problem would, in frustration, use a somewhat less gracious word sometimes. Second, it has also been a very practical policy — not so

well noticed in America, I might say, but very heavily noticed in Europe. It has never been the case that the policy has radically outstripped the means for implementing it. In fact, there has always been very grave and careful attention in formulating policy goals so as not to step out too far ahead of what we thought we could attain.

That has been one of the biggest sources of internal bureaucratic infighting. How, on the one hand, do we look forward, strive for a better way to survive and prosper in a dangerous and uncertain world — but on the other hand, not kid ourselves by pretending certain things are possible when they are not. We would not be serving ourselves nor the cause of deterrence, particularly if the documents were to become public inadvertently. So, the matter of practicality is bedrock in American strategic policy. The third element, I would think, is that policy has been focused not on first strike, not on aggression, but on deterrence and on the alliance's cohesion.

I promised myself some years ago that I would never give even an informal talk on this general subject without a little catechism on deterrence. This is an aside, a commercial, but it is becoming more and more clear to people, and I thought I would share it with you.

When you talk about deterrence, if you really want to be serious-minded about it, you have to ask yourself some subsidiary questions. What regime are you trying to deter? What is its character? What might deter that regime? And what actions which that regime might take are you trying to deter by these forces and policy, as opposed to other forces, other policies, other alliances, and so forth? And under what circumstances are you trying to deter them? Are you trying to deter them on a bright sunshiny day like today? Or are you trying to deter them in a deep crisis? Are you trying to deter an attack on the United States after Europe, Japan, and the Middle East have fallen? These things make big differences. Those are the kinds of questions you must ask yourself to be serious-minded about deterrence.

I'd like to close by listing what I think are five issues that define the practical current alternatives within nuclear policy. I will then juxtapose these five real issues against four somewhat arbitrary, what I would call pseudo-issues, or non-issues, and say why I think they are non-issues.

Of the real issues that I think define the current alternatives and shape them, the first that comes to my mind is strategic defense — including active

defense, ballistic missile defense, air breathing defense, old fashioned civil defense, and new fashioned civil defense, continuity of government, and all of that. With the euphoria associated with the ABM treaty, and certain propensities on the part of McNamara's staff to not buy anything they felt they didn't have to, which included air defense interceptors, strategic defense fell into disrepair. This administration has made a conscious, deliberate and across-the-board effort to revitalize strategic defense. I think that is something new, and its full dimensions have yet to appear.

The second issue has to do with nuclear weapons in regional conflict — the pertinence, or relevance, of nuclear weapons either in casting a shadow or in actual use in a regional conflict, that is, in areas that are not part of a central strategic exchange. The European situation has been resolved, in the sense that we will both have large standing forces in Europe and have well integrated policies in that area. In the other areas there have been attempts to deal with that issue but there remains much yet to do.

The third issue is a question of protracted conflict capabilities — that is, the ability to deal with a long, drawn-out nuclear war. In the style of Herman Kahn, if you think there is nothing worse than a nuclear strike, try two, separated by a month or so. That is really a lot worse. This issue is coupled with strategic defense, because to have strategic defense, to evacuate and try to have some recovery, you must absolutely deter that second strike a month from now. Or else you might as well not bother. Thus, protracted conflict and strategic defense are firmly and logically connected.

The fourth issue is the question of arms reductions. Will we be able to get reductions or not? That

is a very open issue in everybody's mind. The rest of the policy issues take on a radically different character at really lower levels of nuclear arms.

Then I think the final issue is what I would call "survival over the long haul" — by which I mean essentially some 30 or 50 years. It is this issue that deals with the question of how you balance the strength of the economy against the strength of the current military forces.

The pseudo-issues, I would say, include, first, "Do you want flexibility in the weapons arsenal?" I think that's a non-issue. I know of no responsible person who is serious about having inflexibility in all of its logical extremes.

The second one is the budget. Now that may sound funny, and it's certainly true that strategic weapons systems cost a bundle of money — even one-one hundredth of one percent of one year's worth of one system is a bundle of money to me. But nonetheless, in the framework of the overall budget, it has not been true, and it will not be true, in the foreseeable future, that the defense budget of the United States would be dominated by its nuclear component. Indeed, the GNP of the United States will not be dominated by its defense budget. So that is not an issue — the budget does not conflict with survival over the long haul.

The third non-issue is NATO alliance participation in nuclear matters. They're in; they're going to be in. You can't get them out. There is a lot of work being done in managing their participation but their participation is not at issue.

Finally, just to wind up the non-issue list on an absurd note, you can't put the nuclear genie back in the bottle. Talk about a non-nuclear utopia is an impractical discussion.



## **Dr. Joseph S. Nye, Jr.**

**Professor of Government  
Harvard University**

**I** might tell you the story about the great Soviet parade that occurs every November. The missiles go by the reviewing stand first, then come the tanks and the various other equipment, and finally there's this little contingent of men in gray suits and neckties. Brezhnev turns to the fellow next to him and says, "What, comrade, are those people doing in the parade, and who are they?" The answer is, "Those are the arms control analysts and civilian specialists." Brezhnev says, "What in the world are they doing in the parade?" And he's told, "You'd be surprised at how much damage they can do."

That's often the prevailing view of the role of arms control in strategic policy. But it does point out something very important: that political factors deserve a very important place in the security parade, more so perhaps than we've allowed in the last two days. And one of the problems with arms control in this current period of disarray is that

sometimes it's gotten ahead of the parade rather than being an integral part. Part of the disarray that we're seeing in arms control now is deserved. There has been a tendency in the recent past to have arms control for its own sake, rather than as part of security policy.

Let me just give you one example. In 1977, we launched talks on removing our forces from the Indian Ocean. At the same time we were increasing our dependence on Persian Gulf oil from about 3,000,000 to 6,000,000 barrels a day, or nearly half of our total energy oil imports. That was clearly not a very well advised arms control proposal. There are others with which I will not belabor you. So, some of the reaction against arms control has been justified.

One problem that we've seen in the last decade has been the fact that SALT, the strategic arms control component, was made the centerpiece of detente, of a whole attitude toward how to deal

with the Soviet Union. And when detente collapsed, essentially SALT went down with it. If you look at the demise of detente in historical perspective, it's not all that surprising. Since the Soviet revolution, there have been six major periods of hostility and friendship between the United States and the Soviet Union. We seem to vary more in our views and attitudes toward them than they do in their behavior toward us. But be that as it may, the fact that the SALT process was made the centerpiece of the latest swing of that pendulum meant that the SALT process was carried down with it. It may be ironic, but arms control that rests on a cold balance of power between the two countries may be more firmly grounded than arms control that's tied to detente, or to hopes of a renewal of detente.

Those are some of the charges that can fairly be leveled against arms control in the last decade. There are also some unfair charges. We're told that arms control lulled us into letting our defense expenditures and programs fall behind. In some cases, such as the effect the ABM treaty had on ABM R&D, that may be true. But if you ask why we did what we did in defense policy in the 70's, it has a lot more to do with Vietnam, Watergate and major domestic changes than it does with SALT. After all, SALT came after, not before, those major changes.

We have also been told that you can't have arms control because you can't trust the Soviet Union — because they have a conflict-oriented, zero sum approach to relationships. I think that's probably true as regards their attitudes. But I note that Dick Pipes said yesterday that if the balance of power is well maintained, those Soviet attitudes do not prevent finding some areas of common interest. We have found them in the past. I'd argue that the limited test ban treaty, the non-proliferation treaty and the ABM treaty are examples.

Third is the argument that the doctrine of the Soviet Union, because it's different, prevents arms control. I agree that their doctrine is different; I think that came out again in yesterday's discussion. But the difference can be exaggerated to the point where one asserts that no agreement is possible, yet in fact, we have seen some limited, and useful, agreements. I think these charges against arms control should serve as warnings against simple trust in the Russians, or projecting our own views upon the Russians, or expecting arms control to solve all our defense and security problems. But they don't mean that there's nothing we can do.

Indeed, I would argue that there will probably be

a revival of interest in arms control at some point in the 80's for four reasons, which I would argue are security reasons. First, and quite simply, I believe it helps defense planning. When you're trying to assess your opponent's objectives, you have to do it to a degree of prudent worst-case analysis. But if you assume the worst case for absolutely every potential action of your enemy, you're going to break your budget, and you're going to get into that dilemma that Jasper Welch talked about, where you must make tradeoffs between scarce resources and the underlying strength of your security posture. You have to cut off somewhere. So you can't do worst-case analysis on absolutely everything. And the fact that arms control does help give you some degree of predictability, some additional information, some additional transparency and communications about your opponent's objectives, is a help for defense planning. And I'm struck by the fact that my military friends and acquaintances have more tolerance for arms control than many in other parts of the administration.

The second security reason for arms control is crisis stability. The situation that we've discussed in the last couple of days is not one in which the Russians strike first out of the blue, but a crisis that leads into a preemptive situation. Additional communication and transparency help reduce misperceptions which would accentuate instability in such a crisis.

The third security reason for arms control is to maintain public support for a strong and consistent defense policy. This is a point that's often missed when we look too closely at the technology of the various defense issues, and not enough at the politics. Effective nuclear deterrence involves a central dilemma. You have to be able to show that you could use nuclear weapons, but you don't want to scare the hell out of the public by making it look like they're going to be used very easily. There's an area between two poles — between use and non-use — where you have effective deterrence and effective public support. The danger I see is that if you flip back and forth between these poles, you're going to get public reactions which are going to make it impossible to have a long-term, consistent defense policy. In that sense, it strikes me that arms control is an essential component of effective defense.

And this relates to the fourth security reason for arms control, which is the alliance relationship. Take that point about public support and extend it to Europe. Listen to what Russ Dougherty said last

night about European attitudes. For 35 years the balance of power in world politics has been sustained by a situation in which the major states in the world — Europe and Japan (which are, essentially, attached physically to the Soviet Union) — have been attached politically to us. That's of profound importance. The overall alliance relationship has been a bedrock of our policy for 35 years, and it is an essential question in security. And, basically, if the European public feels a strong need for arms control, it's sensible security policy for us to make that a part of our posture.

That is the flaw in Dr. Teller's proposal about nuclear weapons, which was essentially to change the threshold from one between conventional and nuclear, to one between continents. He would use small nuclear weapons for fighting wars in Europe, and draw the real threshold on a no-first-use basis between the U.S. and Soviet homelands. That plays well here; think how it plays in Germany. Compare Dr. Teller's statement focusing on the technology of ERW — I'm not against ERW, by the way — with the realistic politics of maintaining the Western alliance. That is not going to be acceptable in Germany. Or take the statement you heard yesterday about the deployment of SLCMs with no advance warning to our European allies. Again, that is not a decision I oppose. But take that in the context of the statement that Europe is on the way to becoming a nuclear Pearl Harbor, and imagine how it would play in London or Bonn. The inability to rise above technical military fixes and see the larger security and political dimensions of our defense problems is a blindness which we have to avoid. In other words, as we look at the large dimensions, we find at least four real security reasons why arms control has to be a major part of defense policy.

If that is true, what do we do about it? Let me argue that there are about five major paths which we could follow from where we are now. I'll treat them relatively quickly. One is the path of essentially no arms control, which I've argued is too costly, at home and with our allies. A second path,

beloved of some who suffered in the '70s, is just to revive SALT II, say that 1980 was somehow a mistake, and find some minor or major changes in the treaty which will allow SALT II to be revived by the new administration. That strikes me as politically unlikely. Changes that are merely cosmetic don't

go far enough to meet the needs of this administration. Changes that are very deep probably go too far to meet the needs of Moscow. So I think that option is not likely.

The third option is the one the administration has proposed, at least in the Rostow testimony (Ed Rowny was a bit more cautious about it yesterday), which is the deep cuts proposal. It's also been proposed by George Kennan outside the administration. But

deep cuts proposals are not easy. They run the risk of being either destabilizing or non-negotiable. In addition, they may divert us from what we should be focusing on.

Why destabilizing? Imagine the problem of ICBM vulnerability with only half the present number of targets to destroy. Certainly that makes the problem worse. Or imagine across-the-board cuts of 50 percent, as Kennan has suggested, which include the submarines. If half of the 20 submarines left in the force are in port, the Soviets only have ten targets to find as an ASW challenge. If, on the other hand, you say, "Let's leave out the subs and the bombers and let's just concentrate on the land-based forces" — then you have the problem of whether that's negotiable considering that the Soviets have some 70 percent of their throw weight in the land-based forces. They have strong historical and bureaucratic reasons to resist changing that situation in any dramatic fashion in the short run.

In other words, what I fear is that we're going to get a very deep cut proposal because it's a way to hold together a coalition that includes people who want no arms control with others who want a visionary posture. It will hold together a domestic political coalition for a time, but it may divert us from other things we could be doing in arms control, serious steps that I'll get to in a minute. A deep

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cuts proposal has to be carefully thought through, if it's not to be a step in the wrong direction.

A reaction against this would be, "Let's just go back to the 1960's." Let's reread Shelling and Kahn and so forth. Indeed, Tom Shelling has argued that SALT probably got too formalistic and that if we went back to basics we would say, "Don't follow the track from where we were in SALT toward deep cuts. Follow it back to strategy and arms control. Look not for treaties and formalism but for reciprocity, stability in force design, and more transparency and communications through various procedures." I think that makes sense as far as it goes. But I'm afraid it doesn't go far enough. It would be great if the blackboard were clean and you could start all over again, but I suspect that, in fact, it won't work when you have as much written on the blackboard as we have.

For example, think back to the alliances and what it would mean if we said, "Well, we've decided to scrap the whole SALT process and erase the blackboard and go back to strategy and arms control." Not very successful, I suspect. Moreover, it's hard to find really strong cases of reciprocal informal arms control that have worked very well for the strategic area, with one ironic exception, which is right now, in which you have the administration, having first declared SALT to be fatally flawed, nonetheless living with a de facto SALT II agreement. So that we have, maybe, the first instance of such an example in the strategic area but I think it's too soon to generalize very much about that.

If those four options are not likely to succeed, I'm brought to a fifth one, which isn't a panacea but it does have some prospects. It is what I call "nuclear stabilization talks", which have within them four separate tracks, essentially combining pieces of the options I've already mentioned, but placing a much lower emphasis, or lower profile, on SALT.

The first track is what I call "TAC talks", or Talks for Transparency and Communication, an essential part of arms control. The purpose of such talks is not to create good will, but to increase transparency and communication about what your enemy is doing. An example of this would be the Standing Consultative Commission (SCC) which allows us to make sure that there's no interference with our national technical means and to quiz the Soviets in any cases which are ambiguous. TAC talks could go further. For example, they could include regular talks between members of the Joint Chiefs of Staff on the two sides, not to reach

some negotiated agreement, but to increase the degree of transparency and communication.

A second area would be what I call "force structure talks" — again, not necessarily to lead to specific treaties. You could imagine going into such talks with three lists. You'd list those things in your force structure which are unalterable and nothing the other side could do could lead you to change them. A second list is 90 percent unalterable — things you're definitely going to do — but what you do with the margin may be changeable, depending on what the other side does. Then there's a third list for which you say, "These are open. We haven't yet made decisions. What we do depends on what we see you doing." Essentially this is a way to encourage this informal tacit bargaining behavior without having to get into the formalism of the treaty process.

The third path would be in areas where you can reach limited or preclusive agreements. For example, if you could reach an ASAT treaty relating to satellites in geosynchronous orbit, and if it were verifiable, that might be of some assistance with the C<sup>3</sup> problem that we see now. It would not be a great contribution to nuclear stability, but not totally irrelevant either. Or perhaps an agreement banning testing of depressed trajectories of submarine missiles would increase the warning time we were talking about in Session III. In relation to the NCA, again, this is not the solution to all these problems, but it is not an irrelevant contribution.

The fourth of my tracks is SALT, or START, or whatever it's going to be called. I suspect it is likely to be very slow, and for that reason should not be so central as it's been in the past. But it should be there, and it should continue, and if possible we may get something out of it. If that's not possible, we haven't foregone the transparency and communication and tacit bargaining that come from the other tracks of the nuclear stabilization talks.

So, essentially, I argue, let's have TAC talks, and force structure talks, limited agreements, as well as START talks that have a lower profile in this overall nuclear stabilization talks package. In other words, I think that arms control will be back, because it's a political necessity. Defense and security is much more than technology, and when we debate technology in too fine detail, while ignoring the larger political dimensions of the alliance, we're not following a very sensible security policy. If, then, arms control is going to be back for these large reasons, it behooves us to think now about its real relationship to security, and about the rela-

tionship of arms control talks to the overall US-Soviet relationship, which in my view is not going to be a friendly one, but is one where the arms control component can play a limited but useful role. The Carnegie panel that Brent Scowcroft, I and others are on has been trying to develop a new

approach to arms control along these lines, seeing arms control in terms of security. Whether this will work or not I'm not sure. But I do think that we're going to need a lot more thinking about arms control, because whether we like it or not, it's going to be back again.

## **Dr. Jack P. Ruina**

**Professor of Electrical Engineering and Computer Science, MIT  
Senior Consultant for Office of Science and Technology Policy**

**T**his audience has heard many analyses of the military benefits of different systems. We've seen vugraphs showing data, curves, charts and "artists concepts" of weapons to come. A typical situation is that somebody will come up with a stack of a hundred vugraphs to demonstrate the benefits of a particular system — its military promise and its presumed advantages, how much more it can target, how much more cost effective it is, how much more accurate it is than the old system it is about to replace and so on. But in the final analysis the benefits of any new system, and particularly of any nuclear system, to national security depend primarily on how it might affect our behavior and Soviet behavior in a serious confrontation, how the Soviets and our allies might react to our deployment, and our judgment of what form confrontations and crises take. People make up crisis scenarios — Herman Kahn will show you some I'm

sure. He may hypothesize how this or that weapon system will be beneficial in this or that situation but all will be based on little data. All of the charts, graphs, and analyses come down to judgments about the course of events in an unprecedented situation.

The search for precedents in Soviet history and politics is of limited use in judging their behavior in a nuclear confrontation. And there are few Soviets who write about nuclear crisis issues in a thoughtful way for public consumption. Though almost any Soviet writings might be interesting, they hardly provide insight into Soviet decision making in a real nuclear crisis.

We all approach the subject of weapons systems with our own baggage of ideology, attitudes, and prejudices and there is a certain consistency in people's views. To simplify, we compress it all onto a one-dimensional scale — a hawk/dove axis; but this is too simplistic. It would be more useful

to describe attitudes about weapons — particularly nuclear weapons — in more than one dimension. One of my MIT colleagues and I believe a two dimensional description would be much better (see Figure 1). More than two dimensions gets too complex and scholarly and is probably wrong. Let me describe this on the blackboard.

Each of the two dimensions represents a hawk/dove measure. The abscissa, going from zero to one, measures how threatening you feel the Soviets are. If you think the Soviets are a benign group, a little paranoid at times, but who by and large wish us no ill, you're near zero. If you think they're out to do us in at every opportunity, if you suspect Soviet influences in most adverse political events, you're out near one.

On the other axis, the ordinate, I put your judgment of the relevance or importance nuclear weapons have for U.S./Soviet conflicts; that is, for example, whether the specific characteristics of nuclear weapons such as enhanced radiation weapons affect the way we deal with the Soviets. It's quite conceivable to me that you may be very "hawkish" in your view of Soviet intentions, but rather "dovish" about the significance of the details of our nuclear weapons posture on the U.S.-Soviet relationship since as a "dove" you don't consider nuclear weapons as really capable in war fighting.

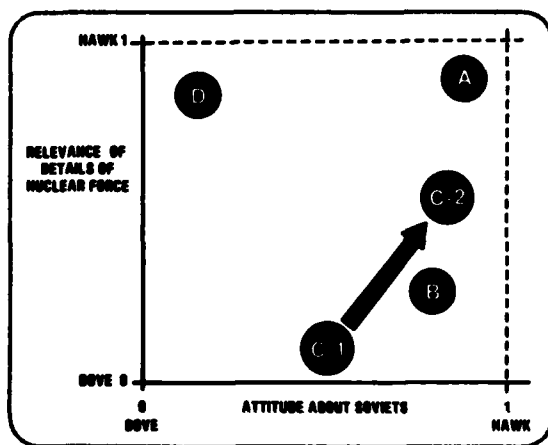


Figure 1

Let me try to place a few people. I'm not going to place Herman Kahn; he defies placement. I'd say the current administration is somewhere out near region (A). I don't know if I'll put them all the way at one/one, but somewhere in that region. They

think the Soviets want to do us in and also that the specifics of the nuclear weapons we have are important in maintaining our security.

Regarding MX — the race track basing system was certainly a logical solution to make our land-based force survivable albeit somewhat bizarre. It was an "engineer's solution" which the public and the Congress didn't take to very well. From a straight military point of view the troubling thing about this basing of MX was that its survivability depended entirely on maintaining secrecy about the missile location. Not that it seems so difficult to keep the location secret, but there would always be gnawing doubt about whether we were successful. Therefore, to put so much money into a system dependent solely on deceiving the other side in the hide-and-seek game without being quite certain ourselves about how successful we were, didn't seem to me like a very good investment.

Air-launched cruise missiles weren't mentioned by others, but I'll comment on them briefly. The cruise missile program seems to me the best way of enhancing or at least maintaining our strategic capability. From what I know about Soviet air defenses — we may well be seeing a significant erosion of the B-52 capability to penetrate (as it is now constructed). It is quite possible to react to Soviet air defense upgrading and I believe the air-launched cruise missile program is the right approach.

I want to briefly discuss ABM, which I wasn't going to talk about at all, but feel impelled to comment on since Edward Teller raised the subject. None of the ABM technologies proposed seems attractive at this point; none would produce very capable defense systems. That doesn't mean the proposed technologies might not have some useful capability for ABM, particularly if you're dealing with the simple problem (as Edward Teller pointed out) of defending missile silos rather than cities. However, what we have to recognize is that the costs are very high — not only in dollars, but also because any meaningful deployment requires abrogating the current ABM treaty which works quite well. I keep invoking Herb York's statement about the fallacy of the last move. In assessing the value of ABM deployment, we must recognize that our deployment will not be the last move. The Soviets will also deploy ABM. Do we really want that world in which both sides have ABM systems for the marginal military benefit ABM can provide? The technology so far proposed is so limited that to my mind there is far more benefit in maintaining

the ABM treaty than in going ahead with any of the ABM systems which have been proposed.

There are many allusions in the press and by some political leaders to space-based high energy lasers for ABM but I don't believe it is even necessary to discuss laser ABM systems as a realistic possibility in the next few decades, if ever.

As for the Carter administration, I think that Mr. Carter, as just described by Brent Scowcroft and Jasper Welch, may have started down here at C-1, thinking nuclear weapons aren't very important, but during the course of years shifted to C-2. There are people in the audience who are rather hawkish, but who believe that detailed measures of relative strength in nuclear weapons aren't very important, and that it's

really conventional weapons that are central to our security. They may occupy region (B). I don't know who occupies region (D) — maybe Russians. If you're a Russian leader you undoubtedly think the Soviets are quite benign and nuclear weapons are very important.

This two-dimensional picture captures the range of possibilities for classification in the hawk/dove spectrum better than a one-dimensional characterization and may clarify the basis of similar and divergent opinions about National Security planning.

Now I would like to discuss my views on some of the matters discussed in the first two sessions. I am not very positive or negative about the B-1 and its military capability. I can understand why the Air Force would like a new airplane — the B-52s are old, although they're hardly the same airplane they were twenty years ago. I understand they have new wing structure, new engines, etc. The claim is that the B-1 is important because of its possible use for tactical non-nuclear missions, but I'd argue that this is not how people responsible for our conventional warfare capability would choose to spend their money. The Air Force studies and briefings I've heard in the past suggest that the B-52s can probably be made to last well beyond the year 2000. And for its strategic role a B-52 is probably

not that inferior to the B-1. The high cost of the B-1 is of course troublesome; I'd have thought that this administration with its concern about budget deficits would be more wary about proceeding with B-1 production when there is so much that needs to be done in the conventional weapons area.

Now I think I'll be a little unfair, and quote Edward Teller although he is not here. Last summer at a small conference we both attended he said he agreed with me about current ABM technology. He said, "However, there are other technologies," and he alluded to them, "which might produce ABMs which are better than those that have been proposed and which we all know about." He said my view might be different if

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I were fully aware of those other technologies — and that may well be.

MAD, mutual assured destruction, is not a policy that anybody formulated and presented as desirable. As many of us have said repeatedly, mutual assured destruction is what we have by virtue of the relative costs and effectiveness of offensive and defensive systems. We have no choice and the arithmetic is very simple as far as I'm concerned, although Herman Kahn may well disagree. It's just that a single nuclear weapon — let's make it a middle-sized one, one megaton — can do so much damage to a city, and costs relatively so little. Add to this that weapons have proliferated to an extremely large number both in the U.S. and the Soviet Union. No technologies known can provide a system to prevent cities from destruction if the other side wills it. This is not a law of physics but a statement about the realities of current technology.

In pre-nuclear days, you thought that if your defense stopped 10 or 20 percent of attacking aircraft, it would be fantastic. But to stop 100 percent was just inconceivable. Given nuclear destruction, given leakage and given the costs, the fact that you can deliver a one-megaton bomb 5,000 miles away for perhaps a total cost of \$10,000,000 and do billions of dollars worth of damage — this is a factor of 1,000 — makes the possibility of the truly



effective defense just impossible with any technology I know. It's extremely desirable of course to avoid keeping populations hostage but the tragic realities are that we just don't know how to do it.

As many speakers here have said, the whole idea of improving our command and control structure for strategic forces is highly laudable and long overdue. Command and control programs have very little visibility, and in part because of that they receive low priority. Fortunately command and control is now getting some national attention.

Admiral Tomb stated the things we want in command and control. We want survivability, endurance, flexibility — I'd like to insert "some" flexibility — responsiveness, credibility. I think we're all for this. By and large, I think putting much more into command and control and communications is a super idea.

There is a persuasive argument that since initiating an all-out nuclear attack almost certainly means national suicide and is therefore not credible, having a strategic force that has some flexibility in use — that can be used for less than an all out exchange — is needed for deterrence. But what is disturbing to me is that the interest in more flexibility has expanded to an interest in preparing for protracted nuclear war fighting. Now people call for capability in protracted nuclear conflict management, for "escalation control" and "escalation agility" to make sure we have no "option gaps." Some fear that the Soviets may have more options than we, in a nuclear confrontation, and want to be sure that we preserve all possible options. The picture that emerges is of a nuclear war analogous to a chess game — the President of the United States sits at one end and the Soviet leader at the other, each with a console controlling his weapons. This assumes that the National Command Authority has precise and timely information about what's happening — both the political and nuclear developments — and that he knows exactly how his every move will affect the Soviets and what options the Soviet may exercise. It also assumes everyone involved on both sides keeps a cool head and uses logic — logic applied to a totally illogical situation.

Anyone involved in the command and control business recognizes such assumptions as mythology; certainly people in the military do. But even some of the talks we have heard at this meeting reflect an interest in getting on with developing capabilities for protracted, carefully controlled nuclear war. The reality is that the information provided to the "chess players" will undoubtedly

be poor or late or both. Reflect upon what has happened in past crises in the United States — and these did not involve any nuclear weapons exploding. The information available in the first hour or two about what was going on almost invariably is poor or absolutely wrong and we may not have an hour or two to react in a nuclear crisis. Also, the controls may be faulty — button A is pressed, and I'm speaking figuratively — but what is supposed to happen does not happen.

What the Soviets would do, what possibilities they would consider in response to our actions, we certainly cannot know. Even the damaging effect of a single nuclear weapon on Soviet territory is totally unclear. Paper analyses of what one megaton would do to any city — how much collateral damage, how much fallout — vary by factors of 10. You've seen OTA analyses, State Department analyses, CIA analyses of the civilian fatalities resulting from an all out strike against our ICBM silos. The number of deaths varies anywhere from 2 to 20 million.

And the greatest uncertainty of all is the behavior of people in times of crisis. Brent Scowcroft referred to that. Here is the President in the White House, or in an airplane, who realizes that he is making decisions, determining the survival of nations; that the number of deaths involved could run into the millions, or tens of millions, or even a hundred million; that everything is going to happen very quickly. With whom does he confer?

Who are the advisors and officials he would consult and where might they be? It's going to be a small and perhaps somewhat randomly selected group making the decisions. There is just no way we can predict — from history, psychology, or what have you — how a small group might behave in a never before experienced crisis.

The matter we're dealing with is beyond only upgrading hardware, though upgrading hardware is clearly in order. Fundamentally we're dealing with a human problem that is beyond a technology fix.

Deterrence does not depend on infinite flexibility, although some flexibility is important. The extent to which our nuclear forces deter the Soviets depends on the fact that both sides have vast survivable destructive power. That doesn't mean that all our destructive power must be survivable, but we must know that enough will survive any attack to be capable of indescribable retaliatory destruction.

Of course, we must have some flexibility in response but we always have had some flexibility in

response. I believe deterrence depends on everyone's uncertainty — what happens after the first nuclear weapon falls is anybody's guess. The unpredictability in response is the major deterrent to either side initiating a nuclear attack however small. The exact numbers and characteristics of our strategic forces are not important. We only must be sure that any opponent knows that many weapons will survive any attack he might consider

and that neither he (nor we) can predict our behavior and our response to any nuclear attack.

For that reason, I am hardly anxious about the presumed inadequacies in the size or quality of our strategic forces. We must do all we can to upgrade our C<sup>3</sup>I but we should not deceive ourselves about the realities of protracted nuclear wars or think that some hardware fixes can eliminate uncertainties inherent in any scenarios of nuclear exchange.

## Dr. Herman Kahn

**Chairman and Director  
Hudson Institute**

**W**hat I want to do today is give "the big picture." I want to take a kind of Russian point of view. I want to talk about the "correlation of forces" the way the Russians talk about it. I want to talk about the historical period in which we live, where we are, where we came from, where we're going.

But let me start by digressing to the discussion we had yesterday on credibility — what would the Russians consider "acceptable?" I believe the discussion would have gone much better if you had had this chart in front of you when Marshall Shulman and Richard Pipes were talking (see Figure 1). There would have then been an amazing amount of agreement. The basic distinction between Shulman and Pipes is at line 4 in Figure 1. For items 5 to 10, neither believes the Soviets would attack and this belief is almost independent of details. This says they both believe in a kind of

"overkill". In other words, deterrence is a simple, philosophical result of both sides having nuclear weapons. But if the Soviet Union were facing items 1 to 3, the U.S. would have to have a good second-strike system to deter the Soviets from an all-out city attack. Incidentally, I think that the Soviets would then likely be deterred even if facing items 1A, 1B, 1C, and maybe even 1D.

Let me get back to my own lecture. I want to take two positions here. One, the position that Jack Ruina took; "nuclear war is terra incognita." Nobody has relevant "hands-on" experience. I'll give an example. At one time I had been in the air defense business about 20 years. Many people here have been in it just as long. Not one of us thought a pilot could see a missile with his eyeballs. But one of the main defenses of our planes over Hanoi was a pilot seeing a mach 2 missile coming at him and evading it. That was a totally unexpected tactic.

I'll give you another example. A hundred-mile-per-hour hurricane is one-sixth of a psi; not 600, but one-sixth. I'll bet a hurricane could take out many of our bases which are supposed to have many psi of protection. Despite billions of dollars spent on research in this area, we have very little hard knowledge, knowledge based on experience. This is not to say we do not know a lot. The billions spent on research have not been totally ineffective. It is simply not all fog. Indeed, I'll make a second point — in many cases the human factors are a lot more predictable than the mechanical/hardware factors. The idea that people's reactions are almost always unpredictable is basically incorrect. And it's not an issue of statistics and small sample size. Those in charge of Russia or the United States are going to be very interested in the survival of their country, or ideology, as the case may be. They are not like your wife when the roast burns.

The quality of deterrence has to do very much with testing it against a series of very improbable events. I will use what is called a "litote," a grammatical construction which is absolutely essential in this analysis; "not improbable," "not implausible" are examples. I do not believe that the Soviets think that the use of nuclear weapons is going to be terribly important in affecting history. I think they believe that *who* exists following a nuclear war is going to affect history. And I also think they believe one should be able to fight a war and survive it and think of it as an experience. I don't think that improving our strategic posture is the single most

important priority in our national policy, but it is important; doing it may prevent us from making a very grievous mistake.

"Mutually assured deterrence" is not a simple philosophical consequence of nuclear weapons, except in situations 5 through 10 (again see Figure 1). When I talked about deterrence, I couldn't care less about deterring a direct attack against United States cities "out of the blue." I was chairman of a strategic policy committee recently. Twenty guys were there, eighteen of them were "hard right." I said, "I want you to imagine the following situation." (I made it quite plausible.) "The Russians are assured a relatively clean win from roughly 1983 to 1987 and they believe that if anything goes wrong, they'll lose 5 million people; if they go very fast about 20 million. That opportunity disappears in 1987 and then things look very bleak for them. Everything goes to hell." Remember the concept Jack Ruina advanced of an empire that's overextended? Well that's very much how they look at some point in the eighties.

Then I said, "How many people here think the Soviets would plot a strike to take advantage of that period from 1983 to 1987?" For whatever it's worth, only one person thought so and he was a physicist. By the way, we may all be wrong together. For what it's worth, almost every NATO or American expert on the Soviet Union accepts the position that the Soviets would not take advantage of such a window of vulnerability unless it were under great pressure. It may be a "window of

Figure 1

**Acceptable risks for a Soviet Union faced with:**

1. War. Attack is:
  - a. Constrained Counter Tactical Deployment
  - b. Constrained Counter Strategic Force (or on Control System)
  - c. Controlled Counter Strategic Force (or on Control System)
  - d. Counter Strategic Forces (or on Control System)
  - e. Mixed Attack
  - f. All-Out Counter City
2. Imminent Attack by U.S. (What Kind?)
3. Desperate Opportunity (e.g., Soviet Union is Evacuated)

4. Intense Crisis Which Threatens an Immediate Loss of Control of:
  - a. Soviet Union
  - b. All of Eastern Europe
  - c. Poland
5. Less Intense Crisis or Less Immediate Threat
6. Long Term Theoretical Threat
7. Window of Opportunity for Calculated War for:
  - a. "World Socialist State"
  - b. Major Gain
  - c. Solution of Internal Problem
8. Double or Nothing Opportunity
9. Callous Calculation of Double or Nothing Opportunity
10. Hitler's "Gottterdammerung"

Figure 2

**Why isn't this curve better known?**

1. It is based on many respected demographic studies.
2. Including studies by the United Nations, the U.S. Census Bureau and the Population Council.
3. It was first published in 1974 in *Scientific American*.
4. There have been front page stories on the data supporting this curve in *The New York Times* and *Washington Post*.
5. The curve is very interesting.
6. Of course, there are some uncertainties in the data and conclusions.
7. But many fewer uncertainties than in the "Limits to Growth" theories taught in most U.S. schools.
8. Why isn't this curve better known?

vulnerability" but it is not normally considered by the Soviets as a "window of opportunity." But we are not paranoid when we think of it as a window of damage.

But it's interesting that all the Soviet experts have the same position that I have, including Pipes, by the way. My only point here is that we have to be richer in our analysis. One can have a very useful discussion between Pipes and Shulman if we focus our attention on items 2, 3, and 4 in Figure 1. Otherwise this discussion is totally uninteresting. You can predict every remark that both sides will make. You need the framework. That's my first and foremost point. The level of discussion of these problems is so low it's unbelievable.

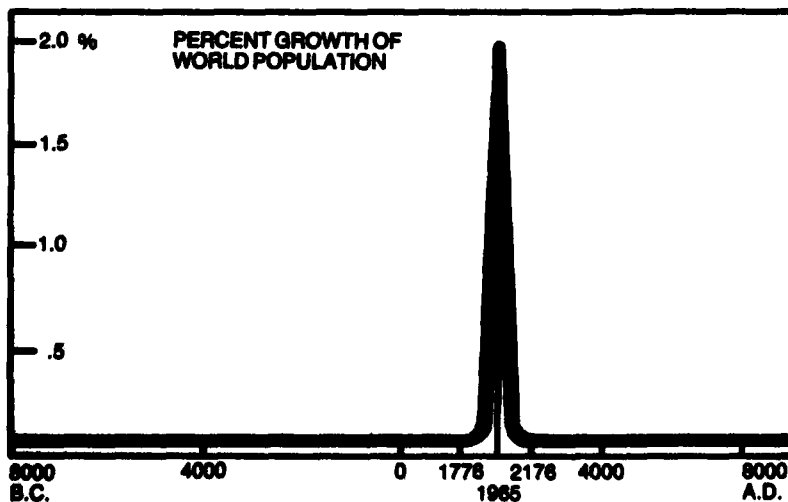
Thank you for the remark on *On Thermonuclear War* (a first-rate book, I recommend it very highly). By the way, I'm now running a nine-volume treatment of nuclear war. I've got a great remark in the first paragraph: "Some people will be appalled at the size of this treatment, others will just be aghast." Then I challenge my critics, "What chapter would you take out?" And they can't find a chapter to take out. Of what use is a nine-volume treatment? Nothing. Totally useless. But we hope to use it as a basis of a lot of two-page treatments, 10-page treatments, thirty-page treatments, etc. And if any of you guys want to work on that project with me, I'd be delighted to accept your help, unpaid. Let me go now quickly to a historical context.

This is a curve of percent growth of population (see Figure 2). I've exaggerated the width of the

spike. At the 1-percent point, it's going to be a hundred years, which means a straight line up and down. We call that the "demographic transition" of the world. It peaked in the mid-sixties. This curve is widely accepted by demographers — perhaps two out of three would agree with it. Those who would not agree wouldn't say it's wrong, they would simply say it's uncertain. As far as I know, nobody would challenge the curve as being clearly wrong. Yet it is almost totally unknown in the entire American school system — I know of only two schools that teach it. The curve goes back to '74. Now I ask, "Why is it unknown?" And I make a point: we live in an environment in which society doesn't resonate too well with this kind of semi-good news. And that's true for military problems as well. We'll come back to this issue.

The basic picture of the historical period we're in can be summarized as follows: two hundred years ago, mankind was everywhere scarce, everywhere poor, everywhere powerless before the force of nature. Two hundred years from now, barring some perverse combination of bad luck or bad management, mankind should be almost everywhere numerous, almost everywhere rich, almost everywhere in control of the forces of nature. There is enormous momentum behind this process. What is the purpose of U.S. military force? In part, to further that process, to protect it, to mold it. It can be most useful to emphasize that there is — or at least should be — a happy ending. I'll give some more details on this happy ending in a few moments.

Figure 2, continued



**Uses of the great transition**

- A. Methodological: as a planning tool (it is a most useful model of what is going on)
- B. Normative: an inspiring and positive image of the future.
- C. Descriptive and predictive: a plausible, even probable, future.

Normally speaking, in the Carter administration, and in many of the previous administrations, including Nixon's, many of those who went to the arms control conference with the Soviets were more afraid of the arms race than of the Soviets. How many of you people have that attitude — more afraid of the arms race than of the Soviets? A good many of you — and yet you're an audience that is likely to take these risks relatively calmly. But that's the norm for the average intellectual of the United States, including the defense intellectual. But the Soviet negotiator doesn't have that position for a number of good reasons. Whether he's right or wrong, from the bargaining point of view, he's ahead of the U.S. negotiator. If the U.S. negotiator is wrong, he should change his point of view. If he's right, we have a problem.

These attitudes (Figure 3) are the exact opposite of the military virtues. You remember William James' comment that we need a "moral equivalent of war?" He meant that and he was perfectly reasonable. Most societies have felt that war is one of the finest activities of the human race. There is a great letter from Oliver Wendell Holmes, an Associate Justice of the Supreme Court. It starts out by saying something like, "War is the noblest activity of mankind. It brings forth qualities of courage, loyalty, altruism, testing ..." It goes on and on. You can't call him a fascist; indeed, he is one of the great men in American history. I'm just trying to give you a sense of the difference between attitudes of our country in the past and present.

When you go from this transition — poor to rich, etc. — you go through a period we call the "emerging problem-prone super-industrial world economy" (see Figure 4). As far as we can see, the problem peaks not in the mid '60s where the population peaked, but roughly 1980 to 2000. By 2000, my own belief is, we'll be in a largely problem-controlled super-industrial world economy. Many of our current military problems are simply part of that emerging economy. In other words, getting from here to there will not be without trouble in many ways.

What I'm trying to do is give you a framework to figure out these problems. Then I'll give you a few details.

At the end of the century, as far as we can tell, seven countries should achieve over a trillion dollars annual gross product (see Figure 5). Let's assume, for a moment, that they're all armed to the teeth, including Brazil. Will the world be safer, or not, than today? I would argue that it will be safer. First, there's the classical theory of balance of power. Two countries tend to have recurrent confrontations and eventually fight it out: one of them takes all or they divide the world between them. Three countries: two gang up on one. Four countries: two by two. Five countries: for the first time, the peace-loving great power (from 1815 to 1914, Great Britain) allies itself with the weakest. We should remember Lord Palmerston's remark to the House of Commons. To paraphrase, "Our country has no permanent friends, only permanent interests."

**Figure 3**

Some new emphases	New concepts about acceptable behavior and activities	Re-evaluation of basic societal priorities
New regulation issues		
<ol style="list-style-type: none"> <li>1. Selective risk avoidance</li> <li>2. Localism</li> <li>3. Protection of environment and ecology</li> </ol>	<ol style="list-style-type: none"> <li>4. Comfort, safety, leisure and health regulations</li> <li>5. Happiness and hedonism</li> <li>6. Public welfare and social justice</li> <li>7. Growing pluralism and freedom in the larger and higher societal objectives</li> </ol>	<ol style="list-style-type: none"> <li>8. Progress less central</li> <li>9. Less faith in market forces (Adam Smith's "invisible hand") and utilitarian or rational ideologies</li> <li>10. Growing indifference to business and economic motivation, morale and efficiency</li> <li>11. Modern family and social values</li> <li>12. Concern with self</li> <li>13. New rites, ceremonies and celebrations — new sources of meaning and purpose, and of prestige</li> </ol>

Six or seven: it works better. Secondly, when it comes to nuclear war, no country is likely to gang up with one or two others and start a war against the remaining ones. And if any two fight, the other five will end up stronger than even the victor.

**McLucas.** Let me make sure I understand your point. Is it more likely that your scenario would apply to nuclear than to nonnuclear?

**Kahn.** Nuclear more than nonnuclear, but to both. The point is that if any two countries fight, it is likely that both will be damaged. Who will look the best after the war? The other five! Further, they may be rather angry at the two that spread radioactivity all over the place.

I don't expect you to be overjoyed at this picture. It's not the kind of thing you can say, "Hey, it's wonderful, all seven are armed to the teeth," but think about it carefully. It would be much safer than today.

Figure 6 is a list of alternatives for treating nuclear war. I believe this list is exhaustive. If you have another way to handle the problem, I'd like to know. I listed all the ways I could think of. I wonder if we could go through and debate this table.

Basically, you have items C1, 2 and 3. I'm not saying that people won't get killed. As far as I know there has been no point in human history when people didn't get killed by other people. Always in human history there were tough guys on the steppes, tough guys on the oceans, tough guys in the hills. And the moment you dropped your guard they came down and attacked you. Of course, since

1890 the civilized world has not had a threat from the steppes or from the sea. We put down the last American Indian revolt and the Russians put down the Kazaks. I would argue that the world is a hell of a lot safer now, except for the nuclear war possibility. Even if you have terrorists and once in a while a city is destroyed. Again, no one is going to be overjoyed by that prospect. We wouldn't be overjoyed even if it was only one city every 20 years, but the situation would be a lot better than anybody ever had before. That's the best I can promise. If it's going to be that good.

This chart is very interesting (see Figure 7). It was drawn up about 10 years ago. Back in 1960 we had a series of seminars at the Institute. We made the following statement: "Even if both sides are careless, it's going to be very hard to have a nuclear war in the next decade." That antagonizes the Left, the Right, and the Center; everybody gets mad if I make that remark. Why did we say it? Does anybody know? Because we think it's right. I'm not saying we never have any axes to grind. We have lots of axes to grind. But a lot of remarks are made without axes to grind. And we predicted that the curve would go up again. I thought the world was in great danger in the '50s. I can give you many scenarios of a nuclear war which would make you say, "Oh my God, how did we avoid it?" Both sides had vulnerable strategic forces. Both sides were accident prone. Do you know what the word "fail-safe" originally meant to SAC and the aircraft manufacturers, including Boeing? It meant "go ahead."

Figure 4

**The "problem-prone" super-industrial economy (1980-2000?)**

1. Scope: more or less worldwide
2. Annual production: GWP \$10-20 trillion, 25-50 billion barrels of liquid fuel, 1-2 billion tons of steel, 25-50 million cars, 1.5-3.0 billion tons of grain, etc.
3. Rate of growth of GWP: 4.0% or less per annum
4. Population: 4.5-6.0 billion
5. Population growth rate: 1/8%  $\pm$  .5% per annum

6. Volume of world trade: \$1-3 trillion of exports
7. Externalities: issues of environment and location cannot be ignored
8. Size of business organization: largest will have \$10-100 billion in gross receipts, and/or 500,000 to 1,000,000 employees
9. Size of project: super-ports, super-industrial plants, \$10-300 billion synthetic fuel industry, North Sea development, etc.

10. Size of equipment: 1,000,000 lb plane, 10,000,000 lb space platform, 1,000 mile transmission line, 8 km antenna arrays in orbit
11. World use of energy: 300-1000 EJ/Year ( $1 \text{ EJ} = 10^{18} \text{ BTU}$ )
12. Probable inflection point (in percent growth rates): passed in early 1970s for both world population and GWP
13. Typical problem: 1985 technological crises, fourteen new emphases

Figure 5

World powers in year 2000					
COUNTRY	GNP* (trillions)	POPULATION (millions)	GNP/CAP* (thousands)	MILITARY BUDGET* (billions)	% GNP
United States	4-1/2	260 +	\$20	200 - 500	5 - 10
Japan	3-1/2	130	30	100 - 500	3 - 12
Soviet Union	2-1/2	300	8	250 - 500	8 - 16
China	1-1/2	1300	1-1/2	100 - 400	5 - 20
Germany	1-1/4	60	20	30 - 100	3 - 10
France	1-1/4	50	20	30 - 100	3 - 10
Brazil	1	200	5	30 - 100	5 - 10
<hr/>					
India	1/2	1000	1/2	25 - 50	5 - 10
U.K.	1/2	60	8	20 - 40	4 - 8
Mexico	1/2	100	5	15 - 20	3 - 10
Italy	1/2	60	8	15 - 25	3 - 5
South Korea	1/4	50	5	20 - 35	8 - 15
Rest of World	5	2450	2	150 - 500	3 - 10
	22-3/4	6000	4	1130 - 3055	5 - 10

\*We use integers and fractions in the above table to emphasize the roughness of the estimates and to observe fine distinctions. All dollar figures are in terms of 1980 dollars.

Figure 6

Where are we going? What will be the role of force in the international system in the twenty-first century?

- A. Minor modification of current system
  1. Limited worldwide nuclear proliferation
  2. Special case - the nuclear rearmament of Germany and/or Japan
  3. Alternatives for NATO-Europe
- B. All-out war withers away
  1. Use, threat of, or indeed any role for force and/or violence in international relations diminishes almost to the vanishing point
- C. Other basic change in system
  1. Five or six-power world
  2. A heavily proliferated world (more or less universal deterrence)
  3. Anti-nuclear agreements
    - a. European strategic defense community
    - b. Asian nuclear defense organization
    - c. Nuclear-free zones
  4. Condominiums (e.g., U.S. - S.U.; U.S. - S.U. - Japan; collective security system(s); U.N.; other worldwide multinational or international organization)
  5. "World government"
  6. World empire (or empires)

7. Disarmed, but "uncontrolled" nations
8. Elimination or control of weapons of mass destruction by

agreement or revulsion (perhaps following a large setback to civilization)

Figure 7

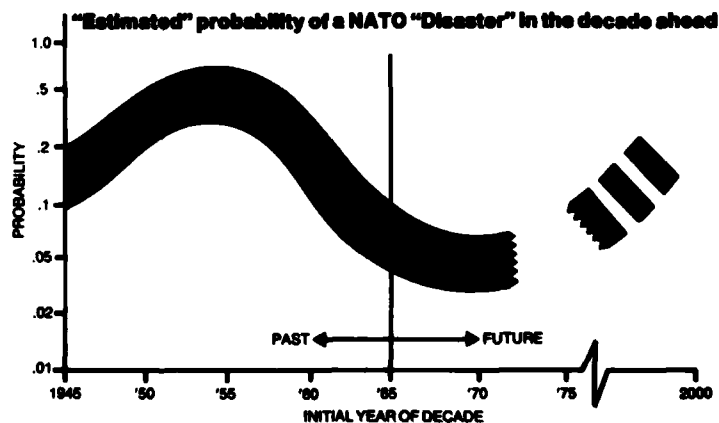


Figure 8

How is theatre nuclear war different?

- A. Destructiveness - balance of terror?
- B. Complexity

C. Common Attitudes

1. Rejection
  - a. Including rejecting deterrence
  - b. But relying on deterrence
2. "Acceptance"
  - a. "Controlled"
  - b. Uncontrolled



That's what "failsafe" meant. "Failsafe" meant: you hit the guy even when he is innocent. How many people remember that? That's what the word "failsafe" meant originally. By the way, that got changed around largely by the civilian analysts. I say that with pride.

We thought the danger would go up again because of mutually assured destruction — with that kind of policy you get careless; you don't watch the numbers; you don't even care about the numbers. Jack Ruina's position would be 100 percent accepted (a very reasonable guy, by the way). Imagine what the maniacs think like! And they exist.

Nuclear war is different (See Figure 8). It's not just another war. It's not just new equipment. It's different and the Russians recognize this. This is a revolution in warfare.

But there are many things that are the same, that have not changed (see Figure 9). If there is an escalation-prone conflict, it will make a difference who can have a bigger threat, who could evacuate. Recuperation is likely. The survivors will not envy the dead.

Nuclear war is the same because there is bargaining — preattack, postattack. There is also the possibility of long shots and surprises — everything does not evolve according to the assumptions, sometimes surprising analyses are right. And finally there is the possibility of mutual destruction — it has always existed. There's nothing we can do about that.

We should spend some time understanding this:

nuclear war is a revolution but at the same time a lot hasn't changed. Both ideas are important.

A comment: there has been a very big change in the nuclear status of the United States in item 11 — mobilization base (see Figure 10). And there has been almost no comment on it. There is very little understanding of this issue in the United States. The Government understands it, but not necessarily the people in the White House. I just spent a couple of days in the Executive Office and I was shocked at how many people do not understand the new policy, though it is very clearly understood, I think, by the President, and by the top executives in DOD.

Most interesting is the list of the five classes of war. Notice the numbers in parens. They give you the rank order results of three independent polls: one conducted by myself, one by someone at WSEG, and one by Tom Schelling. We asked people, "Assume there's a nuclear war, what scenario preceded it?" And they agreed: tension, alert status, scared stiff, very accident-prone forces on both sides, so — number two: a non-accidental accident, or the Soviets strike first, or, we strike first.

It is simply incorrect to make the statement that it's U.S. policy not to strike first. It's U.S. policy not to strike first in the legal sense. But if the Soviet Union hits Europe, there's been sort of an understanding for many years that we might hit the Soviet Union. SAC didn't think of that, because they couldn't believe that there would be any possibility of the Soviets striking Europe without striking us

Figure 8, continued	Figure 9	Figure 10
<p>D. Long-term unacceptability</p> <ol style="list-style-type: none"> <li>1. Meaning of above</li> <li>2. Effect of believing</li> <li>3. Current instability</li> <li>4. Buying time — systems bargaining</li> </ol> <p>E. Emphasis on deterrence</p> <p>F. Well-articulated strategies — balance of terror</p> <p>G. Lack of emphasis on tactics and war fighting</p> <p>H. Need for emphasis on tactics and war fighting</p> <p>I. Technological developments and arms competition</p>	<p>How is theatre nuclear war the same?</p> <ol style="list-style-type: none"> <li>1. We still have escalation-prone conflicts</li> <li>2. Recuperation likely — survivors will not envy the dead</li> <li>3. Bargaining               <ol style="list-style-type: none"> <li>a. Preattack</li> <li>b. Postattack</li> </ol> </li> <li>4. Possibility of long shots and surprises</li> <li>5. Possibility of mutual destruction</li> </ol>	<p>Eight basic bipolar situations</p> <p>I. Five classes of wars</p> <ol style="list-style-type: none"> <li>A. Normal alert status               <ol style="list-style-type: none"> <li>1. A soviet attack "out of the blue" (5)</li> <li>2. An "accidental" accident (4)</li> </ol> </li> <li>B. Tension alert status               <ol style="list-style-type: none"> <li>1. The Soviets solve a problem: (1)</li> <li>2. A "non-accidental" accident (2)</li> <li>3. The Americans solve a problem (3)</li> </ol> </li> </ol> <p>H. Change of policy (mobilization base)</p> <ol style="list-style-type: none"> <li>1. Technological breakthrough</li> <li>2. Deterioration of international relations</li> <li>3. Arms control</li> </ol>

(and thus giving us the opportunity to strike first). But the Europeans felt the other way, that we might not strike for fear of a Soviet counterstrike.

By the way, SAC was bought to defend Europe — not the United States. During the entire postwar period most of the purpose of SAC has been to defend Europe, not the United States. We keep forgetting that. We just give that mission up without any debate. Imagine bombs bursting in Europe, a war going on; I can imagine SAC striking the Soviet Union. We might strike them carefully; just military, you know, no unnecessary urban or population damage. But there's no interest in a U.S. strike out of the blue.

When we ask the analysts how they studied these problems, they spent almost all their time on A1, a little on A2, and totally ignored the three possibilities listed under B1. The analysts in uniform, and out of uniform, who could choose their own ground rules, by their own admission spent most of their time on the cases of least interest, and never looked at the cases of most interest — the tension situation. That's also the evacuation situation. By the way, Americans did not take evacuation seriously because it was never explained to them — that warning would be available because it was brought by the media and not intelligence. An earlier speaker remarked that pennies here are worth more than tens of dollars elsewhere, but until the Russians got an evacuation ability this was ignored. Then all of a sudden evacuation concepts became very respectable in the United States.

Jasper Welch just gave you a description of deterrence which I think is quite good, but I've always got to make things a little more complicated. This is a modification of a statement of Raymond Aron.

*A Complete Analysis of the Use and Control of Force Involves:*

... who deters, influences, coerces or blocks whom from what *actions (alternatives)*, by what *threats and counteractions* in what *situations and contexts*, in the fact of what *counterthreats and counter-counteractions*? ... and why does he do it?

First, there are the political questions: *who, whom, and why*. Then there are the context questions: *alternatives, situations, context actions*. And finally, the simple military questions: *threat (or action), counterthreat (or counteraction), counter-counterthreat (or counter-counteraction)*.

You cannot leave out any one of those words in *italics* if you want to understand what's going on in any real situation. Every one of those words is cru-

cial. I would say the average discussion leaves out about seven of them. And that is not dealing with the issues.

I think one of the most important remarks that Dick Pipes made was about the contempt Americans have for the Russians. That contempt takes on a lot of forms. The most important form is the contempt you find among analysts.

Many analysts contend there is no chance that the Soviets could have an intellectually respectable position with their war-fighting concepts (see Figure 11). The idea that the Soviets could believe in nuclear war fighting, which I will argue is documentable, is totally rejected by many analysts. How could the Soviets believe such nonsense? You know why? In part because of ideology and service interests; in part because the data is on their side. I don't think the last explains why they believed it originally. For a long time they held onto this idea of mobilization for a three-year war after their cities had been demolished. Until 1956, their civil defense program worried about 500-pound general purpose bombs; by the time they took 20 kilotons seriously, we were planning on using megatons. You can describe the Soviet military establishment up to about the mid-1960s as re-fighting World War II with modern equipment, and as a decision-making group dominated by artillery officers. But they had several competent groups. Their Atomic Energy Commission was bright and competent. They had nuclear weapon stockpiles protected from the very beginning. In other isolated areas, they were probably very sensible, at least by our judgment.

Number 5 is the crucial point (see Figure 10). They're different but subject to the same laws — often retarded, often ahead — but the same laws. Within their value systems and ideology, they do reasonable things. Their value system and ideology are different. They're very good today, and I'm not used to thinking of them as very good. By the way, from 1956 to 1961, they spent four times as much on ground-to-air missiles as they spent on the inter-continental mission. We phased out our last ground-to-air gun in 1956, and very properly. Guns just don't shoot down bombers. Over Hanoi, one of the best defended places in world history, they got a 2-percent attrition, which is not very interesting in a thermonuclear war, and they used equipment much more effective than ground-to-air guns.

By the way, they weren't much interested in hitting the United States. That's why they built the IRBMS. We were told that the Badgers couldn't

make it to the United States even on a one-way mission, except when they passed through the DEW line at an altitude not visible to us. I don't know of a single analyst who believed that — no Canadian, no American, no European. You know something? It turned out to be accurate. The Soviets had no interest in hitting the United States. We find that hard to believe, but that's the way it was, roughly, until the mid-1950s.

About the issue that General Dougherty raised yesterday: that Europe is just falling to pieces (see Figure 12). It may be that Europe is in the Alliance. He made that point, but with allies like that our effectiveness is not necessarily increased much. The basic policy in Europe is preemptive surrender. And there's hardly a European who will disagree with that if you talk to him with total frankness. In particular, if the choice is "everybody red or everybody dead" they choose the former. They'll say, "The situation will not arise. The Russians can't push us that far. There are uncertainties." They almost never say, "It's not the policy." They say, "One hundred percent." They note, "We've been conquered before. We've survived it," and so on.

I disagree with two things that Joe Nye said. All of his general remarks were absolutely correct. There's nothing wrong with the neutron bomb; we just lost that debate by dumbness. I've appeared before many audiences in the U.S., in France and in Germany and said, "There are two issues on the neutron bomb: one, it's nuclear; that's complicated

and controversial. Let's put that aside. Second, it is designed to kill enemy soldiers and protect friendly property. Can anybody explain to me why that's wrong? Will somebody please get up and explain to me what the controversy is about this so-called "capitalist bomb?" Nobody has yet gotten up, by the way. How can you lose a debate like that? We did! It was odd. We had to be dedicated to lose that debate. And we did it! We've got to learn how to win these debates.

I would announce that the only purpose of nuclear force is to deter, balance, or correct for the possession and potential use of nuclear weapons by the other side. We don't intend to get any positive advantages out of possessing nuclear capabilities. We would then have a unilateral disarmament of a very intelligent sort because it increases our armament everywhere else, gives us a politically and morally defensible policy.

I believe we have a 50-year problem. The best way to solve this problem is by general staff. I don't think this problem can be solved by civilians — it must be done by people in uniform. They take it seriously. They have a sense of responsibility. They worry about fighting wars. And, in general, the American military establishment is a hell of a lot more serious about the public interest than the civilian establishment. In other words, if you bring up an idea, the military side will run with it. If you bring up an idea to the civilian side of the house, and you die, they forget about it.

The United States, for a number of reasons, does

Figure 11

**Five views of Soviet central war planners**

1. 12-foot tall and malevolent — orchestrators of conflict — purposeful planners of history
2. Mirror image but without bureaucratic restraint
3. Mirror image but retarded
4. Different but subject to same "laws" — often retarded — often ahead
5. As in 4 above, but now very good

Figure 12

**A possible long-term anti-nuclear policy**

1. Explicit limitation of role of nuclear weapons (e.g., no nuclear escalation, some form of (nuclear) *lex talionis*, acceptance of some agreed limitations, etc.)
2. A general defensive emphasis in superpower postures. Emphasis also on active defense as instrument of guarantee (modification—and to some degree weakening—of *lex talionis* concept).
3. Acceptance (but not necessarily promotion) of European nuclear retaliatory (and perhaps deterrence and/or war-fighting) force.
4. Acceptance (but not necessarily promotion) of Asian nuclear retaliatory force.

5. Denuclearized Latin America, Africa, Southern and northern Europe and the near and middle east.

**Characteristics of a European Strategic Defense Community**

1. Independent deterrent force
2. Defensive (second-strike)
3. Delegation of authority for retaliation in kind
4. Unanimity or qualified majority to override retaliation, or other use of force
5. Nuclear de-emphasis
6. Specialized agency—distinct command

not like a general staff. Let me describe the old German general staff briefly. They selected captains and majors with a fair amount of military experience at the battalion level, the company level, and then said, "All right, you're now on the general staff, which means for the next 25 years, you're going to think. You're going to think our problems through. You're not going to have any command duties. And within those 25 years, you probably will make major general if you're very good, and you may or may not get a command at that time." I would say we really need something like that. I have a proposal on how to fake it, which I'll tell you about later. But we have a problem. Congress does not like a general staff for reasons that are quite good, but not good enough.

**McLucas.** Are you willing to see nuclear proliferation take place here and there?

**Kahn.** I may not have a choice. If I could stop nuclear proliferation, I'd prefer the two-power situation, even though I don't think it's so good. When you have seven powers, each with a trillion dollar gross product, a weapons system like the Polaris system, which will be 40 years old in the year 2000, will be like a Model T system. I do not believe that the West Germans and the Japanese will be permanently disarmed. There's nothing I can see that makes that plausible. According to poll data, the Japanese overwhelmingly think they'll rearm after West Germany. But it's probably the reverse. Nobody will really blow up at Japanese rearmament. Everybody would blow up at German rearmament. You would get an extremely tense situation, to put it mildly.

**McLucas.** Including the Russians.

**Kahn.** Actually, the Russians might be less important to you than the Europeans. But all of them would be hostile to it — French, English, Russians, Poles, Americans.

**McLucas.** Are you saying that the Europeans would rather see the Russians take over than the Germans take over?

**Kahn.** If they had that choice and it was with the Germans of record, the answer would be yes. This would probably be less true with the current West Germans. I used to go around Europe in the mid-1960s and say, "The main purpose of the NATO alliance is to keep West Germany down." And everybody, including the Germans, would say, "Yes, that's right." I made that same remark in 1970 and everybody thought I was crazy. It was no longer true. Between 1965 and 1970, the situation had totally changed. And I had not been alert

enough to realize it. Those of you who are old timers here will recognize that remark: that the main purpose of the NATO alliance is to keep Germany down. Or more accurately, the main purpose of the NATO alliance is to disguise a U.S.-West German alliance in a broader context. The rest may be important, but much less so.

**McLucas.** That's right.

**Kahn.** These attitudes change with time. The Nazi legacy has largely disappeared in Europe, much more than in the United States. We have more concern about being anti-Nazi in the U.S. than the Europeans do, indeed by an order of magnitude. It's important to understand that. We should not mirror image. A lot of Americans have latent anti-German feelings. Those feelings have almost disappeared in Europe. Germans are very popular all over the Balkans. They get served before Russians get served. They get served before Frenchmen get served. And they tip less; not less than Russians — less than Frenchmen.

**Question.** I'd like to know where Herman thinks he fits on the two-dimensional drawing.

**Kahn.** I've already mentioned it. I do not wish the Russians ill. I do believe that the Russian Politburo wishes us ill with an intensity that would shock many of us. Let me tell you one quick story here which may be very revealing. I once gave a two-day lecture to the Dutch government — members of the Parliament and the Cabinet. One Minister took me out that night and said, "You know, your lecture was very interesting, brilliant, etc., but all wrong." I said, "All wrong?" "All wrong, beginning to end." I said, "Come on, you've got to give me more details than that." He said, "You remember how you used U.S./S.U. throughout as if they were interchangeable? A dead giveaway that you don't understand the issue." "Because you weren't watching," I replied. "When I talk about strategy, I say 'U.S./S.U.' When I talk about national interests, I say 'United States/Soviet Union.' When I talk about national character, I say 'America/Russia.'" He said, "No, no. You've got the Anglo-American syndrome." "I got the what?" "You've got the Anglo-American syndrome." "Explain."

He points across the table to a person eating. He says, "Suppose you were a Dutchman and I told you I hate that guy? And I really hate him — I hope his wife gets cancer, I hope his daughter runs away with the chauffeur, I hope his son flunks out of high school, I hope he gets a heart attack. Now, if you are a Dutchman, you understand I have a relationship with the guy and you listen with interest. If

you were an American or an Englishman, you'd say, 'This guy needs psychological help.' Did you notice that was your first feeling? Hatred is not allowed in your society. The left can hate the right, and an Army officer can hate the left, and that's it. Nobody else is allowed to hate without looking sick. But the Russians hate you and you don't understand that. You talk about them as opponents. They aren't opponents! They're enemies! And you can't cope with that."

And he's right, but luckily, only partially so. It is the Politburo that hates us. The average Russian does not have those feelings. Otherwise, I would really have a problem. But it is important to understand that the Politburo does hate us. They wish us ill. They will not kill themselves over it. They are not going to take big risks over it. But they hate us.

By the way, they hate us for the best of reasons. They really believe their own ideology. I was talking to Raymond Aron about two months ago. He said that he can't find a single Frenchman who understands that the Russians believe their own ideology (except for a few personal friends). Not the Russian masses anymore, though they sort of believe it. Not the Russian intellectuals. The Russian Politburo believes their own ideology and they believe that they can create a garden on earth; remove poverty, disease, do all kinds of good things. But they are prevented from doing so because of our presence. We're standing in the way. If we could be eliminated, the socialist commonwealth would be greater. And would work. And that's one reason they believe in survival after war; they expect to win the war and create this worldwide socialist commonwealth. I don't wish the Russians ill, but I think they wish us a lot of ill. I don't think they're willing to do much about it. They expect to win in the long run.

On the second issue, the role of nuclear weapons in history, I would probably be below Jack Ruina on the two-dimensional drawing, but for the shadow that nuclear weapons cast. There is a difference between the use of nuclear weapons and the role of nuclear weapons, even if not used. I don't expect nuclear weapons to be used on a large scale in my lifetime and I've already made the decision to live to 2000 because I want to see how it all comes out. That's an irrevocable decision; don't try to talk me out of it.

**Question.** Dr. Kahn, if you don't think that the Russians will use any nuclear weapons, what do you think is the possibility of their using chemical warfare?

**Kahn.** There seems to be a lot of evidence that they are using chemical weapons right now. So the answer is they use it. I don't think they would use them if we were prepared to combat them. We are not prepared that well anymore. By the way, in World War I, one of every five ships carried chemical equipment. In World War II, the Germans thought we had nerve gases. That was the main reason that they didn't use them. They didn't realize that they were technologically way ahead of us. If we are moderately well prepared for it, I think that chemical warfare looks too dangerous in terms of escalation. I don't have strong feelings about that though. The Soviets have always considered chemical warfare to be part of the intrinsic armament in a way that even nuclear was not. In other words, when they were still talking about 500-pound general purpose bombs, they were also talking about protection against chemical warfare — the civil defense people. So I think the answer is that if you are not prepared, there is the definite possibility chemical warfare would be used; if you are prepared, substantially less. You are not prepared at the moment.

**Question.** Why should the "Percent Growth of World Population" curve be better known? What does it have to do with anything else in your pamphlet? Why is it in there? Is that just an aside?

**Kahn.** No. The fact is in 1963 you were incredibly superior to the Soviets. That's when the arms race stopped. The American military budget was constant, in constant dollars, except for the operational expense of the Vietnam war. The Russian budget increased by about 4 percent a year, which is less than their GNP. So it represents a disarmament by them too, in some ways. But 4 percent a year in 17 years is a factor of two, and that, I would argue, is incredibly dangerous.

There are three issues. There's a window of vulnerability — I think that exists. There's a window of danger — I think that exists. But I don't think the Russians see it as a window of opportunity. But I would argue that the world is just a lot more dangerous today because of that Russian superiority.

**Question continued.** I still don't see the significance of that curve on population.

**Kahn.** What the population curve is supposed to illustrate is that there is something called the "Great Transition," and be an archetype or example of many things going on at the moment. In the case of population, the transition is very sharp; the spike would appear as a simple straight line if it were drawn to scale. There's the same kind of, but

less sharp, curve for growth of Gross World Product, which I think is turning over. I don't think we'll ever see 5-percent growth of Gross World Product again for a sustained period as we saw from 1950 to 1973. I think that in terms of rapidity of change in technology, the next 20 or 30 years will see a peaking. In other words, it's going to be faster and faster, not slower. But eventually that too peaks out. Basically, you have an S-shaped curve, not exponentials. One relevant point for the audience is it illustrates that the danger may not increase exponentially over time. If you believe that the danger increases exponentially over time, you are in an absolutely intolerable intellectual and moral position. I don't know how you handle that problem. Now, two of the smartest men in the world, Bertrand Russell and Johnny von Neumann thought danger increased exponentially and both recommended preventive war. They probably had

the highest IQs around, showing how irrelevant high IQ is. By the way, Russell was later told that it was too late, that hundreds of Europeans would die in a preventive war. He said, "I don't care. You've got to stop that monster. You've got to do it." Then he tried to do it the other way. He tried to get us to surrender, in effect, and that was the pacifism of the 1960s. But he was still trying to prevent war by having one side or the other surrender.

I don't believe in preventive war on the basis of a theory. I don't think the Russians believe in preventive war on the basis of a theory. But I still don't know how I could live with myself if there were this exponential increase in danger. We've talked about the exponential increase in population for years now. It just wasn't so. My point is that the population curves illustrate how important S-shaped curves are.

## Session IV

### Question and Answer Period

**M****cLucas.** Jack, you said earlier during discussions on  $C^3$  that great gains are to be made by expenditures in  $C^3$ . I wonder if you had some specific figures in mind. Should we double our expenditures in  $C^3$ , or are you just saying that  $C^3$  is a good thing and therefore deserves more support? Could you quantify it? I also wonder if President Reagan is really going to spend more money or is this just early talk which over a four-year period will wash out?

**Ruina.** I can't quantify it. My impression is that doubling the amount for  $C^3$  would not at all be out of order. But I don't know what the cost allocations are for the different programs that are being talked about. The main point I wanted to make is that the correction of clear flaws in the current system is very much in order but when we plan as though we can manage many steps in a nuclear conflict,

I get very uncomfortable because I think it is totally unrealistic.

**Kahn.** In any situation, there are a lot of details that are important. But there is one thing that is kind of interesting: the issue of the Russians trying to fool you. For instance, how do you find out if they are conducting a constrained attack? Let me backtrack. The Russians in their literature reject any possibility of the kind of control we talk about. They reject it. Nevertheless, I'll argue that when push comes to shove, the argument is persuasive and they will recognize it.

Second point: it took me two years to work out how to handle the controlled attack. The way we do it is to send the Russians a copy of most of our war plan ahead of time and they can then check it out. They don't necessarily try to verify that you've done exactly what you said you will do but only

that roughly the pattern of your attack is close to that of the message. The Russians believe in sending messages; we don't. I then noticed the following. When we started Hudson Institute, we had about 10 young kids there and every one of them automatically worked out this idea of sending a message. But the older generation couldn't work it out because we believe in not communicating. It was funny. Every one of those kids worked out the idea of messages independently.

I'll make another point. One of our first contracts was with The MITRE Corporation. It was called "War Termination." I used to go around the Pentagon saying, "I've got the five greatest experts on how to stop a war which has just started." Basically, these were five young kids who spent a week on this concept. We got into trouble because of that contract. The MITRE Trustees or somebody thought this was war termination in the sense of creating a peaceful world — a left-wing contract. That illustrates the concept that we really don't think of war as an experience but as an end of history. I'd love to give you more anecdotes but I'm taking up too much time.

**Ruina.** I was very impressed with Charlie Zraket's chart which showed the fantastic complexity of the equipment required to even think seriously about battle management. And then I think — call it Bob Everett's first law — "complexity breeds inoperability." The best way to make sure the system doesn't work is to make it as complex as that chart.

**McLucas.** Jasper, do you want to comment? Will the budget actually be bigger under Reagan? And if so, will it go more toward strategic or conventional?

**Welch.** On strategic C<sup>3</sup>, it seems very likely that you'll see increases of two kinds. There are objectively a number of promising programs. The whole general space activity is coming of age and a lot of those costs are generally associated with the communications business, but it is also true that in Reagan's strategic program most of the money is allocated against fairly well defined programs which have been waiting to be financed for some time now. There are some programs that are wedges against needs that have not been well defined because it didn't look like they were going to be funded right away.

Those in the administration working on this are a competent, dedicated, very well organized group, and those leading the charge are numerous and strategically placed. They were chosen for their

views. The program has all the ingredients for moving forward. It is impressive, even for someone who has been around Washington long enough to be cynical about almost everything.

**McLucas.** I'm cynical about a letter I have here from Alan Cranston. He answered a different question than the one I asked him but I think it's a form letter and as such is probably not a private communication. But he says, and I'm not convinced, that this mode (and he's talking about the MX) will guarantee the survivability of U.S. land-based forces in the long run. It left me asking is there any way you can guarantee the survivability of the military system in the long run? I assume that with military systems we are trying to buy some time — 10 years here and 20 years there — but nothing survives in the long run.

**Zraket.** I agree with Jack on the complexity of conflict management from the people- and doctrine-of-procedures viewpoints but not from an equipment viewpoint. In the 1950s we went from people with chalk marks on boards to 50,000-vacuum-tube centers all over the country which are still working — working very reliably. I think that the array of equipment I outlined can, with good design, good testing, easily be made to work as equipment. So to say that we can't do conflict management because of equipment complexity is wrong. There are a lot of other reasons why we may not be able to do it, but I don't think we can blame it on the equipment.

**Kahn.** You do have the problem of the post-attack environment.

**Ruina.** I didn't want to go through a list of crises but we've all heard stories about what happened in the situations of the Dominican Republic, the Mayaguez, the Liberty ship in the Mediterranean. The amount of information available to the leadership in the first hour was just terrible. As somebody pointed out yesterday, it wasn't that they didn't have information, which would have been pretty bad, but they had wrong information which was even worse.

**McLucas.** Even the Sadat case.

**Kahn.** I think that is really misleading. I don't know what's going on and I spend a lot of time trying to find out. I don't know what's going on in El Salvador; I spent a lot of time trying to find out. You drop a nuclear weapon on the Minuteman, I'll know about that. It's a nice, sharp, clean-cut event. Nuclear war has that characteristic — its unbelievably sharp in many of those aspects. And that's a



very important distinction. You're not trying to figure out what the man's wife has been thinking about for the past three years.

**Ruina.** But conflict management involves more than just knowing a nuclear bomb has been dropped somewhere. What damage was done? Where did it come from? What alternatives do I have? If there were more than several nuclear bombs dropped, what's left? Someone asked Admiral Tomb a while ago what would happen if the submarine got only half a message. He said there is a procedure set up for that. Consider the recent assassination attempt on the President: a bullet is also a very clear, unambiguous bit of hardware. It happened right in Washington. The reporters were right there. And my impression was, from newspaper accounts, that there was total confusion in the White House in the first hour about his state of health, who was in charge (as we all know) and so on. And that was right in Washington with a piece of hardware that's often used, often seen, well known and with which we have unfortunately had a lot of experience.

**Kahn.** I'll comment on that. If there is a large nuclear attack directed at cities, forces and everything else, and the aggressor gives you no clues what is happening, you are going to be very confused. I happen to feel that that is one of the least likely ways for a nuclear war to start. In the scenarios I have looked at, in many cases you could tell by dead reckoning what is happening. Charlie Zraket might have mentioned this, but once MITRE had a simulation and I played the thing without asking for any information. I did it by straight dead reckoning. I knew the people who had designed the system, and I knew how the thing would go without asking for any information. I think some nuclear wars may have some of that characteristic: they are more susceptible to dead reckoning if either side has at all thought it through.

I don't think anybody intends to go to nuclear war without a lot of thought. Nobody's going to jump into it with both feet and press every button in the house. They're scared stiff; they're terrified in Moscow; they're terrified in Washington; there's no joy in this thing, no sangfroid, you know. Secondly, the issues are so stark that they tend to swamp personalities. We write lots of scenarios where I ask the question: Do you care who the prime minister of the Soviet Union is or the President of the United States? I argue no. If the guy is

sober and not on drugs, I believe we can more or less predict his reaction. Because the situation is so stark. And this includes the situation where the predicted reaction goes against doctrine.

In fact, my first briefings in the United States were meant to persuade the American generals and senior officials that they would not follow their doctrine. They would be deterred. They didn't understand that: that they'd be deterred. In *On Thermuclear War*, the first chapter tries to explain the following elementary concept to the American military establishment: if there are potentially 100,000,000 dead Americans, we are deterred. They didn't know that. But I can predict the reaction 100% of the time — at least the verbal reaction and I think the real reaction. You don't want to overestimate or underestimate. The fog, the confusion of war is well known. By the way, one very important thing: if it is really true that command authority devolves from the President to the Vice President to the Speaker of the House, forget it.

**Scowcroft:** Jack, I guess what puzzles me is the operational significance of your position. I would certainly agree with the fog of war, the complexity and so on, but it seems to me that you are saying that if you throw up your hands in horror, it won't happen. I guess my position is that if it looks — however unsuccessful we may in fact turn out to be — as though we are doing our best to cope with the possibility of war, we will lessen the chance of that war happening. That's good, and I'm prepared to spend money for it.

**Ruina.** What worries me, what dampens my enthusiasm for putting more and more money into command and control without thinking very carefully about the realities of nuclear war, only came to me after I heard Charlie Zraket's talk. It was that Phase III that worried me. The self-deception — the thinking that we can organize a system that would give us proper information, to manage a nuclear conflict through many escalatory steps — might permeate all the way to the top. That, I think, would be dangerous. My general sentiment is that those who have been involved in command and control exercises know much better. But often political leaders are novices in this thing. No matter how many exercises they participate in, they will be an amateur group in a crisis situation. They will not have dealt with that particular crisis before. They will not have been under that kind of pressure before. They will not, perhaps, have dealt with the Soviets under those circumstances before.

Providing too much flexibility to "amateurs" (in this experience) who will almost surely be ill-informed, is like having too many controls in an automobile — it might be dangerous. I have to think about that a little more. It's not clear to me that more flexibility is better. Strengthening command and control is good, strengthening it to the ultimate may not be better. That's what I feel great discomfort about.

**Question.** I think that some of Dr. Nye's remarks deserve some comment. In discussions of disarmament or arms control in the 60s and 70s, I was always surprised by the absolute absence of any reference to the historical record: about 20 years worth of experience with very serious treaties before World War II. I'm also very struck by the syndrome of wanting so badly for the treaty to survive that we are willing to conceal information about failures of the other side to go along with it. And by the way, that was a very striking feature of the pre-war period as well — the tremendous desire to believe that the treaties were working.

Another point: although it may be a political reality that neutron weapons are not well loved in Europe, one should not forget that there are those Russian tanks. If they start up and begin moving, the political image we've achieved by limiting ourselves may not do us a whole lot of good. There's a problem. We have too often tended to elevate the view that Dr. Nye has stated over the view of trivial mechanical weapons. If the 40,000 Russian tanks start up and are at the English Channel in a week, that will be a rather large political change and the careful process of arms control may not help. It is not clear to me that we get stability. It's not clear that we save money in the end, and keeping arms control for its own sake raises this hope which I find rather odd after all of the little problems we have had with it in the last couple of decades.

**Nye.** Let me deal quickly with the two points. First, I believe that pre-war treaties were much more in the disarmament mold than the arms control mold, and the purpose of my talk about a four-track approach was to get away from the over-belief in formal treaties alone. So I think

you missed the intent or purport of what I was urging as the last of my five options, and stuck me with one of the other options which was not mine. On your second point about the Enhanced Radiation Weapon (and I don't believe that ERW is that significant a factor; I agree with Herman on that), once a political situation arises, you can't pretend that it hasn't. Once you bobble the ball, you can't pretend that you have played it well. And my solution to your point about the Russians reaching the channel is to invest more on the conventional side. I would invest a good many of these dollars from an increased defense budget in an improved conventional capability. Whether to use ERW or Assault Breaker to stop tanks is a choice not only of where you put your technology but also of overall effect. So I'm not sure we agree or disagree on the second point.

**Question.** For General Welch: Dr. Kahn made an interesting suggestion about having a general staff. I wonder if you think we have the equivalent of a general staff in that you and a number of your colleagues, apart from your assignments, worry about these matters?

**Welch.** It's certainly true that a number of us have spent a lot of time in Washington doing essentially general staff work. But that's not the norm even in the Air Force, and the Air Force is much more prone to foster such assignment sequences than the other services.

**Question continued.** What is your reaction to Dr. Kahn's suggestion? Do you think it is a good idea?

**Welch.** The informal general staff career pattern was a good idea for me, personally.

# Closing Remarks

**Robert R. Everett**

**President, The MITRE Corporation**

**I** thank all of our speakers. They've obviously worked at it. They've been open. I think the discussion has been most useful. We've heard a great deal about this very complicated and difficult problem — strategic activities and strategic command and control.

One of the problems that we have in the DOD, and as individuals, is determining at what level of aggregation we think about things. Each of us deals at a particular level, but all systems have subsystems and all systems are part of larger systems. It has been quite clear that in the discussions here, strategic operations are being thought about as more than collections of pieces. In fact, we have had a lot of discussion about strategic operations as subsystems of the larger military operations. We've said very little about tactical, which I feel is very important.

The place of military operations in the larger context — economics, politics, and diplomacy — is hard to determine but I think it helps to think about it. We certainly have done that in the last couple of days.

The C<sup>3</sup> needs are very great. I applaud the recent actions of the President in supporting C<sup>3</sup> and I hope it continues. I do not think we have yet really thought through what it means to do nuclear war fighting. If we do think it through, we will find that there are tremendous needs and problems. We will never be able to solve them all. We will have to be able to fight with what we have; we must make sure that we have as much as we can get and that those things are useful and work.

A lot of people view the world as static. They think that if there is a strategic problem, and if we thought about it properly, we could define a strate-

## Robert R. Everett, Closing Remarks

gic policy and then build a strategic capability with proper strategic C<sup>3</sup> to meet that challenge. Perhaps then we could look forward to an enduring peace. I don't think that way. I think the world is in flux. It will continue to be in flux. If we are lucky, we'll be around to work this problem for a very long time. We'll have a lot of such meetings but never quite come to the end of it. I appreciate Jasper Welch's

comment about survival, about prospering in a dangerous and uncertain world, because that's the way I look at it. It seems to me that's the way it's always been. I read history for education and amusement, and the history of man is a long history of trouble and survival. My own prediction, for what it's worth, is that this will be the future of the world as well.

**PROGRAM**  
**NATIONAL  
SECURITY  
ISSUES 1981  
SYMPOSIUM**

### Introduction

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#### **What is ESD?**

ESD is the abbreviation for Electronic Systems Division, one of several divisions of the Air Force's command structure. It is involved in the research, development, and acquisition of sophisticated electronic systems for the Air Force. These systems, called command, control and communications systems, or C<sup>3</sup> systems, rely heavily on technology. They enable military commanders to detect an enemy, direct a response and monitor the outcome in a way that most effectively utilizes people, weapons, vehicles and other assets.

#### **What is MITRE?**

MITRE is a Federal Contract Research Center chartered to work in the public interest on a nonprofit basis. The company is concerned mainly with the systems engineering of large electronic systems, especially the C<sup>3</sup> systems of ESD. MITRE also provides similar technical support to the other armed services and to government agencies such as the Federal Aviation Administration, the Department of Energy and the Environmental Protection Agency.

#### **What is the C<sup>3</sup> Connection?**

When the U.S. develops a new weapon (such as the MX missile), or a new military capability (such as a quick reaction crisis force), we must also develop a corresponding C<sup>3</sup> capability. And of course, this new C<sup>3</sup> system must mesh with the already existing C<sup>3</sup> infrastructure. While our country's C<sup>3</sup> systems are not as well known to the public as our weapons systems, some of them have received uncharacteristic publicity. Among these are the AWACS (or E-3A) surveillance aircraft, and the so-called "button" that controls our strategic forces. This "button" is actually an elaborate set of equipments and procedures that ensures the security and tight control we all expect.

#### **Why the Symposium?**

The purpose of the symposium is to provide ESD's neighbors an opportunity to learn about and to discuss national security issues across a broad spectrum. Policies regarding national security impact not only our nation's defense posture, but also the distribution of our tax dollars, the extent of our economic influence in the world, and of course our local economy. These issues affect all of us — you don't have to be an expert to be concerned about them and to participate in the meeting. It is hoped that this event will enable people to get a better idea of what ESD does, and will establish a base for a continuing relationship.

## Agenda

Tuesday and Wednesday  
13-14 October, 1981

### Opening Remarks October 13

9:00 - 10:00 a.m.

- **Welcome, Conference Objectives & Context**  
**Lt. Gen. James W. Stansberry, USAF**  
Commander,  
Electronic Systems Division (ESD),  
Air Force Systems Command
- **Policy, Weapons Systems, C<sup>3</sup> Relationships**  
**Robert R. Everett**  
President, The MITRE Corporation
- **Keynote**  
**Gen. Robert T. Marsh, USAF**  
Commander,  
Air Force Systems Command
- **Break 10:00 - 10:15 a.m.**

### SESSION I 10:15 a.m. - 12:30 p.m.

- **Factors in Development of Strategic Nuclear Policy**
- **Introduction**  
*Chairman*  
**Dr. Paul M. Doty**  
Director, Center for Science and International Affairs, Harvard University
- Ambassador Edward L. Rowny**  
Special Representative for Arms Control and Disarmament Negotiations,  
Arms Control and Disarmament Agency
- Dr. Marshall D. Shulman**  
Director, Russian Institute, Columbia University
- Dr. Richard Pipes**  
Senior Staff Member, National Security Council
- Maj. Gen. James L. Brown, USAF**  
Assistant Director for Joint Chiefs of Staff,  
Defense Intelligence Agency
- **Lunch 12:45 - 2:00 p.m.**

### SESSION II 2:15 - 5:30 p.m.

- **Perspectives on Weapons Systems**
- **Introduction**  
*Chairman*  
**Lt. Gen. Robert T. Herres**  
Commander, Eighth Air Force  
Strategic Air Command
- Dr. Richard D. DeLauer**  
Under Secretary of Defense for Research and Engineering
- Lt. Gen. Lawrence A. Skantze, USAF**  
Commander,  
Aeronautical Systems Division (ASD),  
Air Force Systems Command
- Maj. Gen. Forrest S. McCartney, USAF**  
Commander, Ballistic Missile Office
- Rear Adm. Stanley G. Catola, USN**  
Trident Systems Project Office,  
Headquarters, Naval Material Command
- **Reception, C<sup>3</sup> Exhibits**  
5:30 - 7:00 p.m.
- **Dinner 7:00 - 10:00 p.m.**  
**Speaker: Gen. Russell E. Dougherty, (USAF-Retired)**  
Executive Director, Air Force Association

*Continued*

**SESSION III**    October 14

9:00 a.m. - 12:00 p.m.

• **C<sup>3</sup> Systems for the President and Military Commanders**

• **Introduction**

*Chairman*

**Lt. Gen. Hillman Dickinson, USA**

Director, C<sup>3</sup> Systems,  
Office of the Joint Chiefs of Staff

**Lt. Gen. Brent Scowcroft, (USAF-Retired),**  
Consultant, International Six

**Maj. Gen. Winston D. Powers, USAF**  
Deputy Chief of Staff,  
Communications, Electronics, and  
Computer Resources,  
NORAD — Aerospace Defense Command

**Rear Adm. Paul D. Tomb, USN**  
Vice Director of Joint Strategic  
Connectivity Staff

**Charles A. Zerket**  
Executive Vice President  
The MITRE Corporation

• **Lunch**    12:00 - 2:00 p.m.

**Speaker: Dr. Edward Teller**

Senior Research Fellow, Hoover Institute  
of War, Revolution, and Peace,  
Stanford University

**SESSION IV**    2:15 - 5:00 p.m.

• **Strategic Nuclear Policy Alternatives**

• **Introduction**

*Chairman*

**Dr. John L. McLucas**

President of COMSAT World Systems Division

**Maj. Gen. Jasper A. Welch, Jr., USAF**

Assistant Deputy Chief of Staff,  
Research, Development, and Acquisition

**Joseph Samuel Nye, Jr.**

Professor of Government,  
Harvard University

**Dr. Jack P. Ruina**

Professor of Electrical Engineering and  
Computer Science, MIT, and Senior Consultant  
for Office of Science and Technology Policy

**Dr. Herman Kahn**

Chairman and Director, Hudson Institute

• **Closing Remarks**    5:00 p.m.

**Lt. Gen. James W. Stansberry, USAF**

Commander, ESD



## Biographies

(in alphabetical order)

### Major General James L. Brown

Major General James L. Brown is assistant director for Joint Chiefs of Staff Support, Defense Intelligence Agency, Washington, D.C.

General Brown was born November 21, 1928, in Huntsville, Texas, and attended Paschal High School in Fort Worth, Texas. He graduated from Texas Agricultural and Mechanical College in 1951 with a bachelor of science degree and a commission in the U.S. Air Force. He received a master of science degree in public administration from The George Washington University, Washington, D.C., in 1964. General Brown is also a graduate of Squadron Officer School, Air Command and Staff College, and the Air War College, all located at Maxwell Air Force Base, Alabama.

He began his military career in March 1951. After completing F-51 pilot training in March 1952 at Craig Air Force Base, Alabama, he attended jet fighter combat crew training at Nellis Air Force Base, Nevada. In August 1952 General Brown transferred to South Korea, as an F-80 fighter pilot with the 8th Fighter Bomber Group and flew 100 combat missions during the Korean War.

The general returned to Craig Air Force Base in June 1953 and, after attending basic instructor training, was assigned to the 3516th Pilot Training Squadron until December 1955. During the next two years General Brown was a member of the Flying Training Air Force Standardization Board at James Connally Air Force Base, Texas. In January 1958 he entered Squadron Officer School and upon graduation was assigned to the 3565th Navigation Training Wing at James Connally Air Force Base as assistant base operations officer.

In June 1958 General Brown began his assignments in intelligence at Headquarters Strategic Air Command, Offutt Air Force Base, Nebraska, serving in various positions until July 1969. From September 1963 to June 1964, he attended the Air Command and Staff College. He transferred to Andersen Air Force Base, Guam, as deputy chief of staff for intelligence, first with the 3rd Air Division and later with 8th Air Force, from July 1969 to August 1971.

General Brown then entered the Air War College and

upon completion in July 1972 was assigned to Headquarters U.S. Air Force, Washington, D.C., as director of intelligence applications, Office of the Assistant Chief of Staff for Intelligence.

He was assigned as deputy chief of staff for intelligence at SAC headquarters, from July 1973 to August 1976. He then became director of intelligence for Headquarters United States European Command, Stuttgart-Vaihingen, Germany.

Returning from Germany in August 1977, the general served as assistant chief of staff for intelligence at U.S. Air Force headquarters until he assumed his present duties in April 1980.

The general is a command pilot. His military decorations and awards include the Distinguished Service Medal, Legion of Merit, Distinguished Flying Cross, Meritorious Service Medal, Air Medal with four oak leaf clusters, Air Force Commendation Medal and Air Force Outstanding Unit Award ribbon with "V" device.

He was promoted to major general September 1, 1975, with date of rank June 1, 1973.

### **Rear Admiral Stanley G. Catola, USN**

Rear Admiral Stanley G. Catola graduated from the U.S. Naval Academy in 1956 and served as First Lieutenant and Weapons Officer aboard the destroyer USS SOUTHERLAND (DDR743). SOUTHERLAND deployed twice for six month tours in the Western Pacific carrying out patrols between Formosa and mainland China and participating in flood relief operations in Ceylon. After completion of Submarine School in 1958, he served on board the diesel submarine USS BLUEGILL (SS242) completing a seven month deployment in the Western Pacific. Following completion of Nuclear Power School in 1961, he served in Weapons and Engineering billets on board USS TRITON (SSN586), the only submarine powered by two reactor plants and then the largest submarine in the world. TRITON was twice deployed on extended operations during this period. In 1964, Rear Admiral Catola reported to the Ballistic Missile firing Submarine USS ANDREW JACKSON (SSBN619) as Engineer Officer of the GOLD Crew, where he served until 1967 completing five strategic deterrent patrols. His next duty was as Executive Officer of the attack submarine USS TAUTOG (SSN639), during construction, shakedown, refresher training, and deployment. During this tour TAUTOG was awarded the Navy Unit Citation and Rear Admiral Catola was awarded the Navy Commendation Medal.

Rear Admiral Catola commanded USS ANDREW JACKSON (SSBN619) (BLUE) from April 1970 until October 1972 completing five strategic deterrent patrols. During his tour, his ship won the POLARIS/POSEIDON Trophy presented by the Providence Plantation Council of the Navy League of the United States to the most outstanding SSBN for the year, and his ship was also presented the Meritorious Unit Citation. Rear Admiral Catola was awarded a Gold Star in lieu of a second award of the Navy Commendation Medal in 1971 and the Legion of Merit in 1972. During his tour in Command of ANDREW JACKSON, Rear Admiral Catola was also graduated from the Naval War College through the Interim Command and Staff Course which required one month residency at the War College and completion of six

extensive correspondence courses.

Rear Admiral Catola commanded USS HENRY L. STIMSON (SSBN655) (GOLD) from March 1973 to June 1974, through post Poseidon conversion shakedown operations and one strategic deterrent patrol and was awarded the Meritorious Service Medal in 1974.

Rear Admiral Catola was next assigned to the Staff of the Commander in Chief U.S. Atlantic Fleet as Deputy Senior Member, Nuclear Propulsion Examining Board in June 1974 and served as the Senior Member from June 1975 to June 1976. During this tour he certified the safe operation of some sixty-seven nuclear propulsion plants on submarines and surface ships during at sea operations.

Rear Admiral Catola served as Commander Submarine Squadron FOURTEEN from June 1976 until October 1978. He was the 'Commodore' for ten nuclear powered ballistic missile firing submarines, an 18,700 ton submarine tender and a floating dry dock located in the Holy Loch in Scotland. During this tour Submarine Squadron FOURTEEN was awarded the Meritorious Unit Citation and Rear Admiral Catola was awarded a Gold Star in lieu of a second Legion of Merit award.

Rear Admiral Catola reported to the Naval Sea Systems Command, Washington, D.C., on 31 October 1978 as Deputy Commander for Fleet Support. On 8 April 1979, as a result of a reorganization, his title was changed to Principal Deputy Commander for Logistics.

### Richard D. DeLauer

Dr. Richard D. DeLauer was nominated by President Ronald Reagan to be Under Secretary of Defense for Research and Engineering on March 3, 1981. He was confirmed by the Senate on May 6, 1981 and sworn in on May 7, 1981.

As the USDRE, Dr. DeLauer is the principal advisor and assistant to the Secretary of Defense for Department of Defense scientific and technical matters; basic and applied research; development and acquisition of weapons systems; communications, command and control; atomic energy; and intelligence resources. He serves as the focal point for all test and evaluation matters. He is also the Defense Acquisition Executive (DAE).

Prior to his appointment as the Under Secretary of Defense for Research and Engineering, Dr. DeLauer was responsible for TRW Inc.'s Systems and Energy activities, which employed more than 20,000 people, and provided a wide variety of products and services for aerospace, electronic, industrial, civil and commercial markets.

Dr. DeLauer joined TRW in 1958 following a 15-year career as a Naval Aeronautical Engineering officer. In 1960 he was named director of the Titan ICBM development program and three years later was made director of Ballistic Missile Program Management. Dr. DeLauer was named vice president and general manager of the Systems Engineering and Integration Division in 1965, and assumed the position of vice president and general manager of TRW Systems Group in 1968. He was elected an executive vice president of TRW Inc. in 1970, and to the board of directors in 1972.

He is a fellow of both the American Institute of Aeronautics and Astronautics and the American Astronautical Society. He is a member of the National Academy of Engineering, American Association for the Advancement of Science, New York Academy of Science, Sigma Xi, the Engineering Advisory Council of the University of Southern California, the Advisory Committee of the Institute for the Advancement of Engineering, the Stanford Cabinet, and the Associates of the California Institute of Technology. He is Chairman of LA Chamber of Commerce Aerospace

Committee, founding Chairman of the Board of Governors of the American League for Exports and Security Assistance, and national chairman for Corporations of Stanford University.

He is a former member of the Board of Trustees of the University of Redlands, the Defense Science Board, the Naval Research Advisory Committee, and the Board of Governors of the Aerospace Industries Association. Dr. DeLauer was director of Ducommun Inc. and the Cordura Corporation. He was also director of the LA Area Chamber of Commerce.

Dr. DeLauer is the co-author of two books, *Nuclear Rocket Propulsion*, and *Fundamentals of Nuclear Flight*, and has served as visiting lecturer at UCLA on nuclear rocketry.

Dr. DeLauer graduated from Stanford University in 1940 with an A.B. in mechanical engineering. He received a B.S. in Aeronautical Engineering in 1949 from the U.S. Naval Postgraduate School, and an aeronautical engineering degree (A.E.) and a Ph.D. in Aeronautics and Mathematics from California Institute of Technology in 1950 and 1953 respectively.

### **Lieutenant General Hillman Dickinson**

Lt. Gen. Hillman Dickinson is the Director for Command, Control and Communications Systems, Office of the Joint Chiefs of Staff.

#### **Education**

Mass. Institute of Technology  
U.S. Military Academy, BS 1949  
Columbia University, MA Physics 1956  
Stevens Institute of Technology, PhD Physics 1961  
Ground General School, 1949  
Armor School Basic & Advanced, 1950 and 1955  
Command & General Staff College, 1961  
Army War College, 1967

#### **Assignments**

His initial troop assignment was with the 14th Armored Cavalry in Germany in 1950-1953 as Reconnaissance Platoon leader, Company Executive Officer and Tank Company Commander. He then served as a Reconnaissance Battalion S3 in the 3d Armored Cavalry in Virginia, North Carolina, and Maryland before attending the Advanced Course at Fort Knox in 1954-1955. He attended Columbia University for one year receiving a Masters Degree in Physics before reporting to the Military Academy in 1956 where he taught Chemistry and Physics attaining the rank of Assistant Professor and continuing to work on a Physics degree off-duty. He attended C&GSC in 1960-1961 and received his PhD in Physics from Stevens Institute of Technology in 1961.

Assigned to the 10th Armored Cavalry Squadron of the 7th Division in Korea, he served as Executive Officer and Squadron Commander prior to returning to duty in Washington, DC in the Office of the Secretary of Defense, Advanced Research Projects Agency. There he managed and directed the Nuclear Test Detection Satellite Program and was Branch Chief and directed the Surface and High Altitude Nuclear Test Detection Project. He helped organize and was Branch Chief of the Advanced Sensor Project and managed several intelligence projects.

In 1966-1967 he attended the Army War College before being assigned to Vietnam. There he commanded the 3d Squadron of the 11th Armored Cavalry Regiment (Blackhorse) from June 1967 through January 1968. He served as Chief of Plans and Programs for the Assistant Chief of Staff for Military Assistance, HQ MACV until June 1968 returning

to the U.S. to join the Defense Communications Planning Group (Joint Task Force 728), later renamed the Defense Special Projects Group, which was charged with developing the Sensor Program for Southeast Asia. He served as Assistant Deputy Director (for Engineering) and later as Deputy Director (for Engineering). In 1971 he returned to Vietnam as Senior Advisor to the 1st Vietnamese Infantry Division in the northern two provinces of Vietnam participating in the defense against the 1972 invasion by the NVA. His next post was Fort Knox where he served as Commander of the 1st Brigade conducting Armor AIT training until he was promoted to Brigadier General in June 1973 and assigned as Deputy Commanding General charged with operation of the US Army Training Center, Armor conducting both Basic Combat training and AIT Army training. In 1974 he became Deputy Director of Combat Support Systems in the Office of the Deputy Chief of Staff for Research, Development and Acquisition, Department of the Army. There he was responsible for Communications, C&C Surveillance, Target Acquisition Intelligence and EW matters in addition to munitions, nuclear, chemical, materials and other developments. In January 1977, he was promoted to MG and assigned to head the Academic Committee of the West Point Study Group which recently reported to the Chief of Staff. In October 1977, he was assigned to CORADCOM as the first Commander of Army's C<sup>3</sup> Research, Development and Acquisition Command. In June 1979, he was promoted to LTG and assigned as Director for Command, Control and Communications Systems, Organization of the Joint Chiefs of Staff.

#### **Publications**

Lt. Gen. Dickinson has published several papers and articles.

#### **Memberships**

American Physical Society  
Philosophical Society of Washington  
American Academy of Political and Social Science  
Cosmos Club

#### **Decorations Include**

Legion of Merit with 3 Oak Leaf Clusters  
Bronze Star for Valor with Cluster  
Meritorious Service Medal  
Air Medal for Valor with 19 Clusters

**Dr. Paul M. Doty**

Director, Center for Science and International Affairs, Harvard University and Mallinckrodt Professor of Biochemistry, Harvard University.

Presently serves as member of the Executive Committee of the Dartmouth Conferences; the American Academy Committee on Pugwash Conferences; the National Academy of Sciences Committee on International Security and Arms Control; the Council of the International Institute for Strategic Studies; Director, Aspen Consortium for Arms Control and International Security; Board of Directors of the Aspen Institute-Berlin; Board of Directors of the MITRE Corporation; Board of Directors of the Albert Einstein Peace Prize Foundation; Chairman, Editorial Board of *International Security*. Has been a member of the President's Scientific Advisory Committee and of the General Advisory Committee on Arms Control to the President.

Senior Fellow, Aspen Institute; Fellow, National Academy of Sciences; Fellow, American Academy of Arts and Sciences; Fellow, American Philosophical Society; Fellow, Serbian Academy of Sciences and Arts.

B.S. degree from Pennsylvania State College, 1941; Ph.D. degree in Physical Chemistry from Columbia University, 1944; honorary D.Sc. degree from the University of Chicago, 1966. Recipient of Rockefeller and Guggenheim Fellowships. Received American Chemical Society Award in Pure Chemistry, 1956; received Distinguished Alumnus Award from Pennsylvania State University, 1971.

### **Russell Elliott Dougherty**

Executive Director, Air Force Association, retired Air Force general and management consultant.

Served in various staff and command assignments in Far East Air Forces, SAC, U.S. European Command, World War II. Director of the European regional office of the Secretary of Defense, 1965-1967. Deputy Chief of Staff for Plans and Operations, Headquarters USAF, 1970. Commander 2nd Air Force (Strategic Air Command), 1971. Chief of Staff, Supreme Headquarters, Allied Powers Europe, 1972-1974. Commander in Chief, Strategic Air Command and Director Strategic Target Planning, 1974-1977. Retired 1977.

Consultant: United Technologies, Rand Corporation, Defense Science Board.

Planned Operation Powerflight Mission, 1957. U.S. planner, Stanleyville (Republic of Congo) Rescue Operation, 1964.

Director, Northern Natural Gas Company; Board of Directors, Atlantic Council of the United States; Trustee, U.S. Institute of Defense Analysis.

Education: A.B., Western Kentucky University, 1941, J.D., University of Louisville, 1948. Graduate of the National War College, 1960.

Honorary Degrees: LL.D., University of Akron, 1975, University of Nebraska, 1976, and University of Louisville, 1977; D.Sc., Westminster College, 1976. Admitted to Kentucky bar, 1948. Admitted to practice before the Supreme Court.

Decorations: USAF Distinguished Service Medal with 3 oak leaf clusters, Department of Defense Distinguished Service Medal with 2 oak leaf clusters, Legion of Merit with 3 oak leaf clusters, Bronze Star.

Member: Kentucky Bar Association, Omicron Delta Kappa, Phi Alpha Delta, Lambda Chi Alpha.

## Robert R. Everett

### Position

President and Chief Executive Officer of the MITRE Corporation, Member of the Board of Trustees, 1969 to present. Responsible for MITRE's overall activities, including technical, administrative and financial aspects.

### Experience

Mr. Everett became a member of the staff at the MIT Servomechanisms Laboratory in June 1943 under the direction of Dr. Jay Forrester.

When in 1945, Forrester's group began the development of Whirlwind, one of the first electronic digital computers, Mr. Everett acted as Forrester's chief lieutenant and later, when the MIT Digital Computer Laboratory was formed, he became Associate Director. In the late 1940's, the Laboratory became involved in developing digital computer-based aircraft tracking and weapons control for air defense.

As a result, in 1951, a large part of the Digital Computer Laboratory joined the newly formed Lincoln Laboratory, which was established by MIT at the request of the United States Air Force to develop air defense systems and technology. Mr. Everett became Associate Head of Division VI, and a member of the Lincoln Steering Committee, while continuing as Associate Director of the Digital Computer Laboratory. Division VI was responsible for overall systems design and testing and for design of the Control Centers and their computer hardware and software.

Mr. Everett became head of Division VI in 1956, and remained in that position until 1958. During this period, field installation and test of the SAGE system began. SAGE was the first digital computer-based Command and Control system. Division VI continued to advance the digital computer art, developing the first magnetic core memories invented by Forrester, including fabrication, assembly, and testing techniques that are still in use, building the first transistor-driven memory and the first 256 x 256 memory.

In late 1958, the SAGE-design groups of the Lincoln Laboratory organization spun off to become The MITRE Corporation. The purpose of the company was to carry on the systems engineering for the completion and improvement of the air defense system. Mr. Everett assumed the position of Technical Director of MITRE.

By late 1959, MITRE's responsibilities had grown to include other Air Force Command and Control systems and

Mr. Everett was appointed Vice President for Technical Operations. In January 1969, he was appointed Executive Vice President and in May 1969, he was appointed President and a member of the Board of Trustees, a position he still holds.

### Current Committees and Boards

USAF Scientific Advisory Board

Member and Senior Scientist

Various Defense Science Board Task Groups

Advisor, Air Force Electronic Systems Division, Division Advisory Group

Member, Air Force Science & Technology Advisory Group

Member, National Research Council, Assembly of Engineering, Telecommunications & Computer Applications Board

Member, Air Force Studies Board Committee on C/I Survivability

AFCEA Director

Member, Board of Directors, United Way of Massachusetts Bay

Member, Advisory Board, Federal Emergency Management Agency

### Memberships

National Academy of Engineering

Fellow, IEEE

Association for Computing Machinery

American Association for the Advancement of Science

Cosmos Club

Armed Forces Communications & Electronics Association

### Honors

Phi Beta Kappa, Sigma Xi, Tau Beta Pi

Duke University Distinguished Engineering Alumnus Award

Naval Ordnance Award

MIT Corporate Leadership Award, 1976

### Trustee

The MITRE Corporation

Northern Energy Corporation

Institute of Educational Services

### Education

Duke University, B.S.E.E., 1942

M.I.T., M.S.E.E., 1943

### **Lieutenant General Robert T. Herres**

Lieutenant General Robert T. Herres is commander of the 8th Air Force, Strategic Air Command (SAC), at Barksdale AFB, Louisiana. He assumed this command on July 28, 1981. He was formerly commander of the Air Force Communications Command with headquarters at Scott Air Force Base, Illinois.

General Herres graduated from the U.S. Naval Academy at Annapolis, Maryland, in 1954, earned a master's degree in electrical engineering from the Air Force Institute of Technology in 1960 and a master's degree in public administration from The George Washington University, Washington, D.C., in 1965. He graduated from Air Command and Staff College in 1965 and Industrial College of the Armed Forces in 1971.

After graduation from the Naval Academy, General Herres was commissioned in the Air Force and entered pilot training, earning his pilot wings in August 1955.

His first assignment was with the 93rd Fighter-Interceptor Squadron at Kirtland Air Force Base, New Mexico, where he served as a pilot and later as air electronics officer until 1958. He then entered the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio. He next served four years in Europe as a technical intelligence analyst and then a flying training supervisor.

After this tour he entered Air Command and Staff College at Maxwell Air Force Base, Alabama. After graduation in 1965, General Herres remained at Maxwell to conduct courses in weapons employment planning at the Air University until July 1966, when he was selected to attend the Aerospace Research Pilot School at Edwards Air Force Base, California.

In August 1967 General Herres was assigned as a flight crew member to the Manned Orbiting Laboratory program at the Space Systems Division of Air Force Systems Command in Los Angeles and was chief of the Flight Crew Division. Following cancellation of the Manned Orbiting Laboratory program in 1969, General Herres returned to the Flight Test Center at Edwards Air Force Base to serve as

deputy chief of staff for plans and requirements. He left Edwards in 1970 to attend the Industrial College of the Armed Forces at Fort Lesley J. McNair, Washington, D.C.

General Herres became vice commander of the 449th Bombardment Wing at Kincheloe Air Force Base, Michigan, in June 1971. He became acting commander in March 1972 and then commander in November 1972. In March 1973 he went to Southeast Asia for temporary duty as commander of the 310th Strategic Wing at U-Tapao Royal Thai Air Force Base, Thailand. He resumed command of the 449th Bombardment Wing in September of that year.

In February 1974 General Herres was assigned to Headquarters Strategic Air Command, Offutt Air Force Base, Nebraska, as director of command control. He joined the Electronic Systems Division, Hanscom Air Force Base, Massachusetts, as deputy for Security Assistance Programs in April 1975.

General Herres was assigned to Headquarters U.S. Air Force, Washington, D.C., as assistant chief of staff, communications and computer resources in August 1977, and became the director of command, control and communications, Headquarters U.S. Air Force on June 30, 1978. He assumed his present command on June 22, 1979.

He is a command pilot with a senior missileman rating. His military decorations and awards include the Distinguished Service Medal, Legion of Merit with one oak leaf cluster, Bronze Star Medal, Meritorious Service Medal, Air Medal, Air Force Commendation Medal and air traffic controller's badge.



**Herman Kahn**

Herman Kahn is a specialist in public policy analysis and a co-founder and Director of Research of Hudson Institute. Since the founding of Hudson in 1961, he has directed the Institute's research programs in such varied fields as: U.S. national security, arms control, and foreign policy; U.S. domestic policy; the economic and social development of nations; and international business issues. Mr. Kahn directed Hudson's work for the Commission on the Year 2000 of the American Academy of Arts and Sciences. He is a pioneer and leader in the field of future studies, and devotes much of his attention to long-term cultural, economic, political, and technological trends.

Mr. Kahn is the author and co-author of many books: *On Thermonuclear War* (1960); *Thinking About the Unthinkable* (1962); *On Escalation* (1965); *The Year 2000* (with Anthony J. Wiener, 1967); *Can We Win in Vietnam?* (1968); *Why ABM?* (1969); *The Emerging Japanese Superstate* (1970); *Things to Come* (with B. Bruce-Briggs, 1972); *The Next 200 Years* (with William Brown and Leon Martel, 1976); *World Economic Development* (1979); *The Japanese Challenge: The Success and Failure of Economic Success* (with Thomas Pepper, 1979); and *Will She Be Right? The Future of Australia* (with Thomas Pepper, 1980). Articles by Mr. Kahn have appeared in such publications as *The New York Times Magazine*, *Washington Post*, *Fortune*, *Foreign Affairs*, *Bulletin of the Atomic Scientists*, *Daedalus* and *Commentary*. He has also contributed to several anthologies on defense, foreign policies and economic development issues.

Born in 1922, Mr. Kahn holds a B.A. degree in physics and mathematics from the University of California at Los Angeles (1945) and an M.S. Degree in physics from California Institute of Technology (1948). He was a Research Associate at the RAND Corporation from 1948 to 1960. In 1959 he was a Visiting Research Associate at the Princeton Center for International Studies. In 1976 he received honorary doctorates in Public Affairs from the University of Puget Sound and from Worcester Polytechnic Institute. Mr. Kahn is a member of the Council on Foreign

Relations (New York), the Center for Inter-American Relations, the American Political Science Association, Phi Beta Kappa, and Phi Mu Epsilon.

### **General Robert T. Marsh**

General Robert T. Marsh is commander, Air Force Systems Command, Andrews Air Force Base, Maryland. He directs the research, development, test and acquisition of aerospace systems for Air Force operational and support commands.

The general graduated from Logansport High School in 1942 and was attending Wabash College, in Crawfordsville, Indiana, when he was inducted into the U.S. Army Air Forces in 1943. In July 1945 General Marsh received a Regular Army appointment to the U.S. Military Academy, West Point, New York. He graduated in 1949 with a bachelor of science degree in military arts and sciences, and a commission as second lieutenant in the U.S. Air Force. He earned master of science degrees from the University of Michigan in instrumentation engineering and aeronautical engineering in 1956. He has also completed Air Command and Staff College and the Air War College, both schools located at Maxwell Air Force Base, Alabama.

As an enlisted man in the Army Air Forces for almost two years, he completed both aircraft mechanic and aerial gunnery training on B-17s and B-24s prior to his appointment to the academy. Following his graduation, he attended the Air Tactical School of Tyndall Air Force Base, Florida, and in December 1949 entered preliminary technical training at the Atomic Weapons and Radiological Safety School at Keesler Air Force Base, Mississippi. In July 1950 he joined the Armed Forces Special Weapons Project as an atomic weapons assembly officer at Sandia Base, New Mexico. Later, he was assigned to the cadre of the 5th Aviation Field Depot Squadron, an atomic weapon assembly and storage organization, and went with the squadron in 1951 to Sidi Slimane Air Base, Morocco. In December 1952 he transferred to Headquarters 7th Air Division, Strategic Air Command, South Ruislip England, where he served as an armament and electronics staff officer.

From September 1954 to June 1956, General Marsh attended the University of Michigan under the Air Force Institute of Technology program. In July 1956 he was assigned to Headquarters Air Research and Development

Command with duty at Wright-Patterson Air Force Base, Ohio, where he served as project officer in the SM-64A (Navaho) and TM-61-76 (Matador/Mace) weapon systems project offices.

Following Air Command and Staff College in July 1960, General Marsh was assigned to the Ballistic Missile Division, Air Force Systems Command, Los Angeles Air Force Station, California. He returned to Maxwell Air Force Base to attend the Air War College from August 1964 to June 1965.

The general was assigned to Headquarters U.S. Air Force, Washington, D.C. in July 1965 in the Office of the Deputy Chief of Staff, Research and Development, as a staff officer in the Directorate of Reconnaissance and Electronic Warfare. He later became chief of the Projects Division in the Directorate of Space. He completed his tour of duty at the Pentagon as executive officer for the deputy chief of staff for research and development.

In September 1969 General Marsh returned to Wright-Patterson Air Force Base as deputy for reconnaissance, strike and electronics warfare. In June 1973 the general received his first assignment to Air Force Systems Command headquarters as deputy chief of staff for development plans. He became deputy chief of staff for systems in October 1973 and was appointed vice commander in August 1975.

He was commander of the Electronic Systems Division, Hanscom Air Force Base, Massachusetts, from May 1977 to January 1981. He assumed his present command in February 1981.

His military decorations and awards include the Distinguished Service Medal with one oak leaf cluster, Legion of Merit, Air Force Commendation Medal with one oak leaf cluster, Air Force Organizational Excellence Award with two oak leaf clusters and Army Good Conduct Medal. He also wears the master missile badge.

He was promoted to general February 1, 1981, with same date of rank.

### **Major General Forrest S. McCartney**

Major General Forrest S. McCartney is commander, Ballistic Missile Office, Air Force Systems Command, Norton Air Force Base, California. He is responsible for managing the research, design, development and acquisition of Department of Defense ballistic missile systems. These systems include the M-X intercontinental ballistic missile development program, Minuteman force improvements and the advanced ballistic reentry systems.

General McCartney was born March 23, 1931, in Fort Payne, Alabama. He graduated from Gulfport Military Academy in 1949; received a bachelor of science degree in electrical engineering from the Alabama Polytechnic Institute, Auburn, in 1952; and earned a master's degree in nuclear engineering from the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, in 1955. He is also a graduate of the Armed Forces Staff College, Norfolk, Virginia.

General McCartney received his commission as a distinguished graduate of the Reserve Officers' Training Corps program at Alabama Polytechnic Institute and entered the regular Air Force in October 1952. His first assignment was with the Air Force Logistics Command at Robins Air Force Base, Georgia. He entered the Air Force Institute of Technology in 1953 and upon graduation served as project officer for various programs involving special weapons and their delivery, and for nuclear weapons safety systems studies at the Special Weapons Center, Kirtland Air Force Base, New Mexico.

In June 1959 General McCartney was assigned to the newly formed Satellite Control Facility, Sunnyvale, California, and served as an Air Force satellite controller on early space operations. From November 1961 to August 1966, General McCartney was assigned to the Office of Space Activities, Headquarters Air Force Systems Command at Andrews Air Force Base, Maryland. As project officer he was involved in the Titan III program and various Air Force communication satellite programs.

Following graduation from the Armed Forces Staff College in 1966, General McCartney joined the Directorate

of Space at Headquarters U.S. Air Force, Washington, D.C., as the program element monitor for satellite communications programs and other selected space-related efforts.

General McCartney transferred to the Air Force Eastern Test Range, Patrick Air Force Base, Florida, in July 1971 and served as the director of range engineering. He was then assigned to the Space and Missile Systems Organization, Los Angeles Air Force Station, California, in June 1974 as the system program director for the Air Force Satellite Communication Systems Program. In August 1976 General McCartney was reassigned within the organization as deputy for space communication systems. He next was assigned to Norton Air Force Base as vice commander of the Ballistic Missile Office in September 1979, and assumed his present duties in November 1980.

His military decorations and awards include the Distinguished Service Medal, Legion of Merit, Meritorious Service Medal and Air Force Commendation Medal with three oak leaf clusters. He also wears the master missile badge.

The general was promoted to major general June 1, 1980, with date of rank July 1, 1976.

### **Dr. John L. McLucas**

Dr. John L. McLucas is President of COMSAT's World Systems Division. This Division provides satellite communications services through the INTELSAT and INMARSAT international organizations and a program of research and development carried out by COMSAT Laboratories.

Previously, Dr. McLucas had served as Executive Vice President of International Communications and Technical Services.

From 1977 to 1979 Dr. McLucas served as President of COMSAT General Corporation, a subsidiary of COMSAT, after having been Administrator of the Federal Aviation Administration since November 1975. During the previous two and one-half years, he was Secretary of the Air Force after serving four years as Under Secretary.

Dr. McLucas was President and Chief Executive Officer of the MITRE Corporation from 1966 to 1969. During the two preceding years, he was assistant Secretary General for Scientific Affairs with the North Atlantic Treaty Organization (NATO) in Paris.

During World War II, Dr. McLucas spent three years in the Pacific as a radar officer in the U.S. Navy. In 1946 he went to work for the Air Force Cambridge Research Center in Cambridge, Massachusetts, and in 1950 he joined the electronics firm of Haller, Raymond and Brown (HRB) Inc. in State College, Pennsylvania. Seven years later he became President of the firm and remained in that position when it became HRB-Singer, Inc.

Born in Fayetteville, North Carolina, on August 22, 1920, Dr. McLucas earned a B.S. degree from Davidson College in 1941, a M.S. degree in physics from Tulane University in 1943, and a Doctorate in physics with a minor in electrical engineering from Pennsylvania State University in 1950.

He is a fellow of the Institute of Electrical and Electronic Engineers (IEEE), a fellow of the American Institute of Aeronautics and Astronautics (AIAA) and a member of the National Academy of Engineering.

From 1979-1981, Dr. McLucas served as Chairman of the Board of the Armed Forces Communications & Electronics

Association (AFCEA). He is currently Chairman of the Air Force Space Division Advisory Group.

Dr. McLucas also served as Chairman of President Reagan's Task Force on cockpit crew size for the new generation commercial aircraft.

**Joseph Samuel Nye, Jr.**

Joseph Samuel Nye, Jr. is professor of government at Harvard University. He received his bachelor's degree summa cum laude from Princeton University in 1958. He did post-graduate work at Oxford University on a Rhodes Scholarship, earning a degree in philosophy, politics, and economics in 1960. He received a Ph.D. degree in political science from Harvard University in 1964.

From January 1977 to January 1979, Dr. Nye was appointed Deputy to the Under Secretary of State for Security Assistance, Science and Technology, and chaired the National Security Council Group on Non-Proliferation of Nuclear Weapons. Upon his departure, Secretary Cyrus Vance awarded him the highest Department of State commendation, the Distinguished Honor Award.

He is a member of the Trilateral Commission, the International Institute for Strategic Studies, and of the Council on Foreign Relations. He serves on the Commission on International Relations of the National Academy of Sciences and advisory committees for the Department of State. He is co-chairman of the Carnegie Endowment Panel on U.S. Security and the Future of Arms Control.

In the past, Dr. Nye has been an adviser to the Georgetown University School of Foreign Service; a director of the United Nations Association; a trustee of Wells College, and a Governor of the Atlantic Institute for International Affairs. He has served as Chairman of the Research Advisory Board of the Committee for Economic Development. He was a member of the Ford Foundation's Nuclear Energy Policy Study.

A member of the editorial boards of *Foreign Policy*, *International Security*, and *International Organization* magazines, he is author of many articles in professional journals. His most recent books are *Power and Interdependence* (co-authored with Robert Keohane), Little Brown, 1977; and *Energy and Security* (co-edited with David Deese) which was published by Ballinger Publishing Company, December 1980.

In addition to his teaching at Harvard, Dr. Nye has also taught for brief periods in Geneva, Ottawa, and London.

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**Richard Pipes**

Staff Member, National Security Council

Richard Pipes joined the National Security Council in February, 1981, with primary responsibility for the Soviet Union and Eastern European affairs.

He attended secondary school in Warsaw, Poland, and received his B.A. from Cornell University in 1945 and a Ph.D. from Harvard University in 1950.

He has been a member of the faculty of Harvard University since 1950 and is currently on leave of absence as Frank B. Baird, Jr. Professor of History.

Dr. Pipes was a Senior Research Consultant at the Strategic Studies Center from 1973-78 and a member of the Executive Committee of the Committee for the Present Danger from 1977-80. He is a member of the Council on Foreign Relations, and the Editorial Boards of *Strategic Review*, *Comparative Strategy*, *Slavic Review*, and *Ethnicity* as well as an Advisor to Encyclopedia Britannica.

He served in the U.S. Air Force from 1943-46.

Dr. Pipes is a Fellow of the American Academy of Arts and Sciences. He was Chairman of Team "B", a special group formed to review National Intelligence Estimates in 1976.

His principal publications include:

*Formation of the Soviet Union* (1954)

*Europe since 1815* (1968; 1970)

*Strive*, two volumes (1970; 1980)

*Russia under the Old Regime* (1974)

*U.S.-Soviet Relations in the Era of Detente* (1981)

### Major General Winston D. Powers

Major General Winston D. Powers is the deputy chief of staff for communications, electronics, and computer resources for the North American Aerospace Defense Command (NORAD) and the U.S. Air Force Aerospace Defense Command (ADC); and chief, systems integration office, U.S. Air Force Aerospace Defense Center (ADC), which have their consolidated headquarters at Peterson Air Force Base, Colorado.

General Powers was born on December 19, 1930, and hails from Brooklyn, New York. He has a bachelor of arts degree from McKendree College, Illinois, attended graduate school at The George Washington University, and completed the Industrial College of the Armed Forces.

He began his military career by enlisting in the U.S. Air Force in November 1950. After basic training, he was assigned to the Air Defense Command at Hancock Field, New York. He volunteered for navigator training at Ellington Air Force Base, Texas, in September 1952, and was graduated the following year. He then had combat crew training at Randolph Air Force Base, Texas, before an assignment as a navigator instructor at Ellington Air Force Base, Texas.

In May 1957, General Powers entered the Tactical Communications Officer Training School at Scott Air Force Base, Illinois. After graduation in June 1958, he was assigned as commander of the 314th Air Division Early Warning Radar Station at Cheju, Korea. He returned to Scott Air Force Base in June 1959, for duty with the 1918th Communications Squadron.

General Powers was graduated from McKendree College in August 1961, and was subsequently assigned to the Air Force Command Post at the Pentagon as a communications officer. In July 1963, he was selected to attend the Communications System Engineering Program of American Telephone and Telegraph Company in New York City. After completing their Education-With-Industry program, he was assigned as communications engineer for the Defense Communications Agency — United Kingdom, located at Croughton, England.

In August 1967, General Powers was assigned to the Tactical Communications Area, Langley Air Force Base, Virginia, where he served as director of tactical communi-

cations operations and then as director of fixed communications operations. He returned to a flying assignment in July 1970, with the 460th Reconnaissance Wing at Tan Son Nhut Air Base, Republic of Vietnam, flying 75 combat missions in the EC-47.

In July 1971 he was assigned to the Organization of Joint Chiefs of Staff as the Air Force member of the Plans and Policy Division, J-6. In October 1973, General Powers was reassigned to Headquarters U.S. Air Force as special assistant for joint matters in the Directorate of Command, Control and Communications, Office of the Deputy Chief of Staff, Programs and Resources.

General Powers returned to Korea in February 1974, as commander of the 2146th Communications Group and director of communications-electronics for the 314th Air Division at Osan Air Base. He returned to Headquarters U.S. Air Force in November 1974, as chief, plans and programs division, directorate of command, control and communications, where he also served as chairman of the command, control and communications panel, and later as a member of the Program Review Committee of the Air Staff Board.

General Powers became deputy director of telecommunications and command and control resources, Office of the Assistant Chief of Staff, Communications and Computer Resources, Headquarters U.S. Air Force, in September 1975. He became the director in June 1978.

On July 1, 1978, General Powers was appointed deputy director of command, control and communications, Headquarters U.S. Air Force. He assumed his present position as deputy chief of staff for communications, electronics and computer resources for NORAD/ADC on October 11, 1978. General Powers became the chief of the newly formed Systems Integration Office, Headquarters Aerospace Defense Center (ADC), on January 1, 1981.

He is a master navigator with more than 4,000 flying hours. His military decorations and awards include the Legion of Merit, Meritorious Service Medal with two oak leaf clusters, Air Medal with one oak leaf cluster, Air Force Commendation Medal, Presidential Unit Citation emblem, and Outstanding Unit Award Ribbon.

He was promoted to the grade of major general on July 1, 1981, with date of rank September 1, 1977.

### **Ambassador Edward L. Rowny**

Edward L. Rowny received a B.S. degree from Johns Hopkins University in 1937 and entered the United States Military Academy, graduating as a second lieutenant in the Corps of Engineers in 1941.

During World War II he served as company commander and later as S-3 Operations Officer of the 41st Engineer Regiment in Liberia, Africa. In mid-1942, he was a member of the cadre of the 92d Infantry Division, Fort McClellan, Alabama, where he served as Assistant Division G-3 Operations Officer and later as commander of the 317th Engineer Combat Battalion.

He attended the Command and General Staff College at Fort Leavenworth, Kansas, in 1943 and in mid-1944 took the 317th Engineers to Italy. Later in 1944 he commanded an infantry battalion and subsequently a regimental task force of the 92d Division. He participated in two Italian campaigns.

From 1945 to 1947, General Rowny served with the Operations Division of the War Department General Staff in Washington, D.C., where he worked on strategic plans for the completion of the war against Japan and plans for the design of the post-war Army.

In 1947 he went to Yale University, where in 1949 he received two masters degrees — one in International Relations and the other in Civil Engineering. Subsequently, he was assigned to the Far East Headquarters in Tokyo, Japan, as a planning officer.

In the early stages of the Korean conflict, he helped plan the Inchon Invasion and acted as official spokesman for General MacArthur. He made the landing as X Corps Engineer and was subsequently Corps G-4 (Supply Officer). He then became Executive Officer of the 38th Infantry Regiment, 2d Infantry Division, and later served as the 2d Division's Chief of Staff. During the last six months of fighting in Korea, he commanded the 38th Infantry — "Rock of the Marne" — Regiment. Altogether, he fought in seven Korean campaigns.

In May 1952, General Rowny was assigned to the Infantry School at Fort Benning, Georgia. Following his qualification

as a parachutist in October 1952, he became Chief of the Advanced Tactics Group and later Assistant Director of the Tactical Department. While at Fort Benning, he initiated the development of Army doctrine on the employment of tactical atomic weapons.

He attended the Armed Forces Staff College, Norfolk, Virginia, in February 1955, and in July was assigned to SHAPE in France. There he served as Secretary of the Joint Staff for Generals Gruenther and Norstad. In May 1958, he returned to the U.S. to attend the National War College.

In June 1959, he became the Army member of the Chairman's Staff Group, Joint Chiefs of Staff, a position he held until June 1961. From June until September 1961, he was chairman of a special study task force to augment forces in Europe, working directly under the Secretary of Defense, Mr. McNamara.

General Rowny was the Assistant Division Commander of the 82d Airborne Division from September 1961 to May 1962. During this period he served as Chief of the Field Test Committee of the Army Tactical Mobility Requirements ("Howze") Board.

In June 1962, he was sent to Vietnam where he established the Army Concept Team in Vietnam charged with testing and evaluating new Army concepts for counterinsurgency operations. He introduced armed helicopters into Vietnam.

In June 1963, General Rowny returned to the U.S. to serve as the Special Assistant for Tactical Mobility as a deputy to the Assistant Chief of Staff for Force Development, Department of the Army. It was his job to provide centralized direction and coordination of the Army tactical mobility program, which led to the establishment of the Army's first air mobile division.

In June 1965, General Rowny assumed command of the 24th Infantry Division, Augsburg, Germany. In September 1966 he became the Deputy Chief of Staff for Logistics, Headquarters, United States Army, Europe and Seventh Army, Heidelberg, Germany. During the latter period he was in charge of moving our troops and equipment from France after President De Gaulle ordered U.S. troops to leave.

*Continued*



From August 1968 to September 1969 he was Deputy Chief of Staff, Headquarters, United States European Command, Stuttgart, Germany.

In September 1969 he assumed duties as the Deputy Chief of Research and Development in Washington. In June 1970, he assumed command of I Corps (Group), Camp Red Cloud, Korea, a position which he held until July 1971. He was promoted to Lieutenant General in July 1970.

In August 1971, General Rowny was assigned as the Deputy Chairman, NATO Military Committee, in Brussels, Belgium. Here he established and chaired the Mutual Balanced Force Reductions (MBFR) Group.

General Rowny was the JCS Representative for the Strategic Arms Limitation Talks from March 1973 until he retired from the Army June 30, 1979.

General Rowny was awarded a Doctor of Philosophy degree in International Studies by the American University in May 1977. He was awarded an honorary Doctor of Science degree by Alliance College in May 1981.

From August 1979 to February 1981 General Rowny was a fellow at the Wilson Center, Smithsonian Institution, where he worked on a comparative analysis of United States and Soviet negotiating.

On April 30, 1981 General Rowny was nominated by the President to be Special Representative for Arms Control and Disarmament Negotiations and to serve as the Chief Negotiator and head of the U.S. Delegation for Arms Control Negotiations, with the rank of Ambassador. He was confirmed by the Senate on July 27, 1981.

### **Dr. J. P. Ruina**

Dr. J. P. Ruina received his B.S. in Electrical Engineering from the City College of New York in 1944. He then attended the Polytechnic Institute of Brooklyn, where he received his M.S. and his Doctorate in Electrical Engineering in 1949 and 1951 respectively. From 1948 to 1950 Dr. Ruina was a research fellow at Microwave Research Institute of the Polytechnic Institute of Brooklyn.

In 1950 Dr. Ruina went to Brown University as an instructor in Electrical Engineering. He became Assistant Professor in 1951 and was Associate Professor from 1952 to 1954. He went to the University of Illinois as a Research Associate Professor in the Control Systems Laboratory until 1959, when he became Research Professor in the Coordinated Science Laboratory and Professor of Electrical Engineering until 1963.

From 1959 to 1963 Dr. Ruina was on leave of absence from the University of Illinois to serve in the Department of Defense. He became Deputy for Research to the Assistant Secretary of Research and Engineering, U.S. Air Force, 1959 to 1960. In 1960 he served for one year as Assistant Director, Defense Research and Engineering, Office of the Secretary of Defense, and in 1961 became Director of the Advanced Research Projects Agency.

Since 1963, Dr. Ruina has been a Professor of Electrical Engineering at the Massachusetts Institute of Technology. During a two-year leave of absence from MIT in 1964-66, he served as President of the Institute for Defense Analyses in Arlington, Virginia. From 1966 to 1970 he was also Vice President for Special Laboratories at MIT.

Dr. Ruina has served on many government advisory committees in the Department of Defense; Department of Transportation; Department of Health, Education and Welfare; the National Science Foundation; the Executive Office of the President and the Office of Technology Assessment. He was a member of the General Advisory Committee of the Arms Control and Disarmament Agency from 1969 to 1973.

He received the Flemming Award as one of the Ten Outstanding Young Men in Government in 1962. He is a

Fellow of the Institute of Electrical and Electronics Engineers, the American Academy of Arts & Sciences and the American Association for the Advancement of Science. Other memberships include the International Scientific Radio Union, the International Institute for Strategic Studies, the Council on Foreign Relations, and Sigma Xi.

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**Brent Scowcroft**

General Scowcroft was born in Ogden, Utah on March 19, 1925. He was educated in Ogden City schools and entered the army in 1943. He received an appointment to the United States Military Academy at West Point, New York, where he graduated in 1947. He received a Master's Degree in 1953 and a Doctorate in 1967 in international relations from Columbia University, and attended Lafayette College, Georgetown University School of Language and Linguistics, Armed Forces Staff College, and the National War College.

He graduated from pilot training in October of 1948 and then served in a variety of operational and administrative positions from 1948 to 1953. In 1953, he was assigned to the Department of Social Sciences at the U.S. Military Academy, where he was appointed assistant professor of Russian history. He remained there until 1957, when he entered the Strategic Intelligence School in Washington, D.C.

From June 1959 to August 1961, General Scowcroft was assigned as Assistant Air Attache in the American Embassy, Belgrade, Yugoslavia. He then returned to the United States and entered the Armed Forces Staff College. In February 1962, he was transferred to the United States Air Force Academy in Colorado and served as professor and Acting Head of the Political Science Department.

From September 1964 to June 1967, General Scowcroft was assigned to Headquarters, U.S. Air Force, in the office of the Deputy Chief of Staff, Plans and Operations, and served in the Long Range Planning Division, Directorate of Doctrine, Concepts and Objectives. He next attended the National War College at Fort McNair in Washington, D. C.

General Scowcroft was assigned in July 1968 to the Office of the Assistant Secretary of Defense for International Security Affairs and served in the Western Hemisphere Region. In September 1969, he was reassigned to Headquarters, U. S. Air Force, in the Directorate of Plans as Deputy Assistant for National Security Council Matters. In March 1970, he joined the Organization of the Joint Chiefs of Staff and became the Special Assistant to the Director of the Joint Staff.

General Scowcroft served as Military Assistant to the President from February, 1972, until August, 1973. In January, 1973, he became Deputy Assistant to the President for National Security Affairs. In November, 1975, he was appointed Assistant to the President for National Security Affairs, a position which he held until the end of the Ford Administration on January 20, 1977. He was retired from military service on December 1, 1975, with the rank of Lieutenant General.

He has an aeronautical rating as pilot, and his decorations and awards include the Defense Distinguished Service Medal, National Security Medal, Air Force Distinguished Service Medal with two oak leaf clusters, Legion of Merit with one oak leaf cluster, and the Air Force Commendation Medal.

General Scowcroft is currently a consultant on foreign policy and national security affairs.

**Marshall D. Shulman**

**Education**

University of Michigan, A.B., 1937  
Columbia University, M.A., and Certificate, Russian Institute, 1948  
Columbia University, Ph.D., 1959  
Other graduate work in Government and Economics at the University of Chicago, 1938-39, and at Harvard University, 1939-40.

**Professional Background**

Special Adviser to The Secretary of State for Soviet Affairs, 1977-1980  
Director, Russian Institute, Columbia University, 1967-1974, 1976-1977, July 1981-  
Adlai E. Stevenson Professor of International Relations, Columbia University, 1974-  
Professor of Government, Columbia University, 1967-74  
Scholar in Residence, Aspen Institute for Humanistic Studies, Summer, 1973  
Visiting Fellow, Adlai Stevenson Institute, Chicago, 1972-73  
Fellowship grant, International Research and Exchanges Board, 1972  
Fellowship, American Council of Learned Societies, 1971-72  
Professor of International Politics, The Fletcher School of Law and Diplomacy, Tufts University, 1971-78  
Research Associate, Russian Research Center, Harvard University, 1962-67  
Ford Foundation Travel and Study Award, 1966  
Visiting Research Scholar, Carnegie Endowment for International Peace, 1963-64  
Associate Director, Russian Research Center, Harvard University, 1954-62  
Consultant, RAND Corporation, Social Science Division, 1960-61  
Lecturer in Government, Department of Government, Harvard University, 1956-60  
Year of travel and study under Rockefeller Public Service Award, 1953-54

Special Assistant to Secretary of State, 1950-53  
Information Officer, U.S. Mission to the United Nations, 1949-50

United States Air Force, 1942-46  
Vice President, Council for Democracy, New York, 1940-42  
Writer, Staff of National Safety Council, Chicago, 1938-39  
Reporter, *Detroit News*, 1937-38

**Fellow**

American Academy of Arts and Sciences

**Member**

American Association for the Advancement of Slavic Studies  
American Council on Germany, Board of Directors  
American Political Science Association  
Arms Control Association, Board of Directors  
Council on Foreign Relations, New York  
Harvard University, Russian Research Center, Visiting Committee

*International Security*, Editorial Board

International Political Science Association

Istituto Affari Internazionali, Rome

*Journal of International Affairs*, Editorial Advisory Board  
Lehigh University, International Relations Visiting Committee, 1976-77

National Academy of Sciences, Advisory Committee on USSR and Eastern Europe

United States Department of Commerce, Advisory Committee on East-West Trade

**Publications**

Dr. Shulman is widely published.

**Lieutenant General Lawrence A. Skantze**

Lieutenant General Lawrence A. Skantze is commander of the Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.

General Skantze was born on June 24, 1928, in the Bronx, New York. After graduation from Cardinal Hayes High School in 1946, he enlisted in the U.S. Navy and served as a radio operator. In 1948 he received a competitive appointment from the U.S. Atlantic Fleet to the U.S. Naval Academy, Annapolis, Maryland. He graduated in June 1952 with a bachelor of science degree in engineering and a commission as a second lieutenant in the U.S. Air Force. He received a master's degree in nuclear engineering from the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio, in 1959.

General Skantze received his basic pilot training at Marana, Arizona, followed by advanced training at Reese Air Force Base, Texas, where he received his pilot wings in August 1953. He next entered B-26 combat crew training and in February 1954 was assigned to the 90th Bombardment Squadron at Kunsan Air Base, Korea. In January 1955 he returned to the United States to become aide to the commanding general of Fourteenth Air Force at Robins Air Force Base, Georgia. General Skantze entered the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio, in August 1957 and graduated in 1959.

His initial assignment in the research and development field was as a project engineer with the joint Air Force-Atomic Energy Commission Nuclear Powered Airplane program in Germantown, Maryland. In August 1961 he was assigned as a staff officer to the deputy chief of staff for research and development at Headquarters U.S. Air Force, Washington, D.C. From June 1963 to August 1965 he was assistant executive officer to the under secretary of the Air Force.

General Skantze graduated from the Armed Forces Staff College in January 1966 and then served for three and one-half years as director of system engineering and advanced planning in the Air Force Manned Orbiting Laboratory

Program at the Space and Missile Systems Organization in Los Angeles.

In August 1969 he was assigned to Headquarters Air Force Systems Command, Andrews Air Force Base, Maryland, as director of assignments and later as senior officer manager. In April 1971 he was assigned as deputy for AGM-69A Short Range Attack Missile at the Aeronautical Systems Division.

General Skantze served as system program director for the E-3 Airborne Warning and Control System at Hanscom Air Force Base, Massachusetts, from June 1973 to June 1977 when he became deputy chief of staff, systems, Air Force Systems Command. He assumed his present position in March 1979.

He is a command pilot and wears the Senior Missileman badge. His military decorations and awards include the Distinguished Service Medal, Legion of Merit with two oak leaf clusters, Meritorious Service Medal with one oak leaf cluster and Army Commendation Medal.

General Skantze was promoted to the grade of lieutenant general on March 1, 1979, with same date of rank.

**Lieutenant General James W. Stansberry**

Lieutenant General James W. Stansberry is Commander of the Electronic Systems Division, Air Force Systems Command (AFSC) with headquarters at Hanscom Air Force Base, Massachusetts.

General Stansberry was born December 29, 1927, in Grafton, West Virginia, and graduated from the U.S. Military Academy, West Point, New York, in 1949. He earned his master of business administration degree, with distinction, in 1956 from the Air Force Institute of Technology. In conjunction with his master's studies he was the recipient of the Mervin E. Gross and the Wall Street Journal Awards presented annually to the top graduate.

General Stansberry began his military career by enlisting as a private in the Army in 1945. He was subsequently appointed to the U.S. Military Academy and following his graduation was commissioned in the Air Force and served from September 1950 through December 1954 in the Armed Forces Special Weapons Project at Albuquerque, New Mexico.

After graduation from the Air Force Institute of Technology in September 1956, he was assigned to the Northern Air Materiel Area, Pacific, with duty as Chief of Production at the Kawasaki-Gifu Contract Facility at Gifu, Japan.

He was assigned as Assistant Professor of Air Science at Michigan College of Mining and Technology from April 1959 to August 1961. He then transferred to the Air University at Maxwell Air Force Base, Alabama, and served on the Air Force Reserve Officers Training Corps headquarters staff for two years.

Following graduation from the Armed Forces Staff College in January 1964, he was ordered to the Air Force Directorate of Nuclear Safety, Kirtland Air Force Base, New Mexico. In July 1968 he transferred to the Office of the Assistant to the Secretary of Defense (Atomic Energy) in Washington, D.C. This tour of duty culminated in his appointment as Deputy Assistant to the Secretary of Defense (Atomic Energy), in which position he served until July 1971. After a two-year tour of duty with Air Force

Systems Command, he returned to the Pentagon in August 1973 to serve on the Air Staff as Deputy Director of Procurement Policy. In August 1974 he was appointed Deputy to the Deputy Assistant Secretary of Defense (Procurement), Office of the Assistant Secretary of Defense (Installations and Logistics). During that tour of duty, he conducted a major Department of Defense study of defense contract profitability (Profit '76) which resulted in major changes in Department of Defense profit policy. From February 1977 to January 1981 he was Deputy Chief of Staff for Contracting and Manufacturing, Air Force Systems Command, Andrews Air Force Base, Maryland.

General Stansberry is listed in Who's Who In America.

His military decorations and awards include the Distinguished Service Medal, Legion of Merit with one oak leaf cluster, Air Force Commendation Medal and Army Commendation Medal.

He was promoted to lieutenant general 10 March 1981.

## Edward Teller

Edward Teller was born in Budapest, Hungary in 1908. He received his technical training in Germany, at Karlsruhe Technical Institute, the University of Munich, and the University of Leipzig where he earned his doctorate under Werner Heisenberg. He also spent two years as a Research Associate in Gottingen, and a year as a Rockefeller Fellow with Niels Bohr in Copenhagen. In 1934, while in Copenhagen, he married his childhood sweetheart, Augusta Harkanyi (Mici).

Because of the political situation in Europe, Dr. and Mrs. Teller went to England where he was a lecturer at the University of London. In 1935 they came to the United States, and he became Professor of Physics at George Washington University, a post he held until 1941. Because of his training and an accident of fate, Dr. Teller was one of the first people in this country to be aware of the possibility of the development of an atomic weapon in Germany. He became a citizen in 1941, and in 1942 he responded to President Roosevelt's call and became a physicist with the Manhattan Project, leaving his chosen field of theoretical physics for the field of applied science.

The scientific possibility of an even more powerful explosive was apparent to Dr. Teller early in the Manhattan Project, and it was to this development that he devoted his attention. In 1949, after spending three years as Professor of Physics at the University of Chicago, he became the Assistant Director at Los Alamos Scientific Laboratory. In 1952 he became the Consultant at the new Lawrence Livermore Laboratory, in 1953 Associate Director, and in 1954 Director.

For fifteen years after 1960 Dr. Teller was the Associate Director at Lawrence Livermore Laboratory and Professor of Physics at the University of California. He is currently a Senior Research Fellow at Hoover Institution at Stanford University, holds the Arthur Spitzer Chair of Energy Management at Pepperdine University, and is Consultant at Lawrence Livermore National Laboratory. Dr. Teller is a Fellow of the American Physical Society and the American Nuclear Society, serves on the Board of Governors of

American Friends of Tel Aviv University and the board of ThermoElectron Corporation, Association for the Advancement of Science, American Geophysical Union, American Ordinance Association, Scientific Advisory Board of the USAF, Scientists and Engineers for Secure Energy, and the Committee of Protectors of Andrei Sakharov.

Dr. Teller has also made important contributions in many areas of physics. He has played an important role in developing the peaceful uses of nuclear reactions, the safety measures for nuclear energy, and in the development of wind power energy in Hawaii. He continues to be active in fusion research and has a new book about to be published on this subject. Since 1972, Dr. Teller has devoted a major portion of his time to energy issues and has written innumerable articles on this topic, including his book, *Energy From Heaven and Earth*, (W. H. Freeman, 1979) which has recently been released in paperback. Dr. Teller's most recent book, *Pursuit of Simplicity*, published by Pepperdine University Press, seeks to familiarize laypeople with the complex world seen by physicists and also to clarify some of the central social issues connected with science and technology.

### **Rear Admiral Paul D. Tomb**

Rear Admiral Paul David Tomb, United States Navy, is the Vice Director, Joint Strategic Connectivity Staff, Offutt Air Force Base, Nebraska. In this position, he is responsible for long-term planning and policy guidance as well as the day-to-day functioning of the staff. The Joint Strategic Connectivity Staff reports to the Chairman, Joint Chiefs of Staff and is responsible for analyzing and reporting on the systems, facilities, and procedures which support National Command Authorities-to-forces command control communications connectivity. It also is charged with making recommendations for improving that connectivity.

Paul David Tomb attended Syracuse University for one year prior to entering the United States Naval Academy, Annapolis, Maryland, in July 1947. Graduated and commissioned Ensign on June 1, 1951, he subsequently advanced in rank to that of Rear Admiral.

Following graduation from the Naval Academy in 1951, he served aboard the USS WRIGHT (CVL-49) as Assistant Navigation Officer and Assistant Gunnery Officer. Detached from USS WRIGHT (CVL-49) in December 1952, he next had submarine training at the Submarine School, New London, Connecticut. Completing instruction there in June 1953, he reported the next month on board the USS TILEFISH (SS-307) and served there from July 1953 to November 1955, and subsequently served on the Staff of Commander Submarine Squadron FIVE until 1956. In the month of July 1956, he reported to Nuclear Power School, New London, Connecticut, for duty under instruction. From December 1956 to June 1957, he had further training at the Nuclear Power Training Unit, Idaho Falls, Idaho. In August 1957, he reported to the commissioning crew of USS SARGO (SSN-583) where he served as Assistant Engineer, followed by a tour as Commissioning Engineer Officer, USS THEODORE ROOSEVELT (SSBN-600) (BLUE); and subsequently advanced to Executive Officer of that ship.

Admiral Tomb assumed his first command as Commanding Officer, USS SKIPJACK (SSN-585) in August 1964, departing there to command USS GEORGE WASHINGTON CARVER (SSBN-656) (BLUE) from October 1967 to October 1969. He served on the staff of Commander Submarine Flotilla TWO from October 1969 to July 1970, and was then assigned to the Office of the Chief of Naval Operations until August 1971, at which time he served in the Navy Secretariat as Executive Assistant and Senior Aide to the Assistant Secretary of the Navy for Financial Management. Admiral Tomb then reported for duty as Commanding Officer, Naval Submarine Base, Pearl Harbor, in August 1972, serving in that capacity until August 1975, at which time he reported to the Staff of the Chief of Naval Operations as the Deputy Director of Attack Submarine Programs until June 1976. In September 1976, he reported to Ankara, Turkey, as Chief, Navy Section, Joint U.S. Military Mission for Aid to Turkey. In July 1978, he assumed duties as Commander Submarine Group EIGHT, Commander Submarines Mediterranean, and Deputy Commander Area Anti-Submarine Warfare Forces, U.S. Sixth Fleet. In September 1980, he assumed his present duties as Vice Director, Joint Strategic Connectivity Staff, Offutt Air Force Base, Nebraska.

Rear Admiral Tomb has the Legion of Merit with Gold Star; Meritorious Service Medal; Navy Commendation Medal with Gold Star; Navy Expeditionary Medal; Navy Occupational Service Medal, Europe Clasp; and the National Defense Service Medal with Bronze Star.



**Major General  
Jasper A. Welch Jr.**

Major General Jasper A. Welch Jr. is Assistant Deputy Chief of Staff/Research, Development and Acquisition, Hq U.S. Air Force, Washington, D.C.

General Welch earned a bachelor of science degree in physics, magna cum laude, from Louisiana State University, Baton Rouge, in 1952. He earned a master of science degree in 1954 and a doctorate in physics in 1958 from the University of California, Berkeley. He was a distinguished military graduate of the Reserve Officers' Training Corps program at Louisiana State University and commissioned as a second lieutenant in the Regular Air Force in May 1952. General Welch is also a distinguished graduate of the Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C.

His first assignment was in August 1952 with the Armed Forces Special Weapons program at Sandia Base, N.M., as a student and then instructor in the early atomic energy program. From September 1953 to June 1954, he attended the University of California, Berkeley, under the Air Force Institute of Technology program.

After a short tour of duty at the Air Force Special Weapons Center at Kirtland Air Force Base, N.M., General Welch was assigned in November 1954 to the Lawrence Livermore Laboratory of the Atomic Energy Commission at Livermore, Calif. He led an experimental nuclear weapon design team which developed the basic design concept still used in most operational systems. While assigned to Livermore Laboratory he completed his doctoral studies under Nobel laureate Luis W. Alvarez.

He returned to the Air Force Special Weapons Center in September 1957 as chief of the Theoretical Physics Branch and scientific adviser to the director of research. For the next five post-Sputnik years, he led a team to determine the effects of nuclear weapons detonated in the upper reaches of the atmosphere and in space. During this period General Welch was invited to present the results of his pioneering scientific research in space physics to the National Academy of Sciences and several international symposia. In

August 1962 he was assigned to the RAND Corporation where he was involved with the strategic and politico-military implications of ballistic missiles and space systems.

In January 1963 General Welch was assigned to Headquarters Air Force Systems Command, Andrews Air Force Base, Md. During 1963 he served as a member of the politico-military staff of Project Forecast, a major assessment of the future of the Air Force. In 1964 he was the Air Force member of a team appointed by the secretary of Defense to oversee the first systematic analysis of resource allocation among strategic offensive and defensive forces. He moved to the West Coast Study Facility of Air Force Systems Command at Los Angeles in July 1965. There he directed studies that led to the initiation of more than a dozen major Air Force programs, including the modern cruise missiles.

In August 1968 he entered the Industrial College of the Armed Forces. Following graduation in July 1969 he transferred to Headquarters U.S. Air Force, Washington, D.C., as chief military analyst for the assistant chief of staff for studies and analysis.

From 1962 to 1969, General Welch was also a consultant to private industry on the peaceful uses of nuclear explosions for the production of petroleum. He served as a consultant to the Air Force Scientific Advisory Board, Defense Science Board, National Aeronautics and Space Administration, North Atlantic Treaty Organization Advisory Group on Aerospace Research and Development, and the President's Science Advisory Committee. He is author or co-author of many published technical reports, studies, journal articles and a book, "The Atomic Theory of Gas Dynamics." He is a member of the National Academy of Engineering, the American Physical Society, the American Geophysical Union and the Council on Foreign Relations.

He was assigned to the Office of the Secretary of Defense in September 1971 and served as assistant director of defense research and engineering for strategic systems review and analysis. In 1972 General Welch became staff director of a high-level panel appointed by the secretary of Defense to examine certain key aspects of strategic policy.

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## Symposium Program

He served for a brief period in 1973 as special assistant to the deputy chief of staff, research and development at Headquarters U.S. Air Force.

General Welch resumed his work on strategic policy in August 1973 as special assistant to the assistant to the Secretary of Defense for atomic energy. In October 1974 he was assigned to Headquarters U.S. Air Force as assistant for strategic initiatives to the deputy chief of staff for plans and operations and, in September 1975, General Welch became assistant chief of staff for studies and analysis, also at Headquarters U.S. Air Force. He was then assigned as director of concepts and analysis, Office of the Deputy Chief of Staff, Programs and Analysis prior to returning as assistant chief of staff for studies and analysis, in January 1979. He was assigned as defense policy coordinator on the National Security Council Staff, Wash., D.C. on November 1979.

His military decorations and awards include the Distinguished Service Medal, Legion of Merit with two oak leaf clusters, Air Force Commendation Medal and the Air Force Outstanding Unit Award ribbon.

He was promoted to major general Feb. 6, 1976, with date of rank June 16, 1973.

**Charles A. Zraket**

**Experience**

1978 to Present

Executive Vice President and Trustee

The MITRE Corporation

Bedford, Massachusetts and McLean, Virginia

MITRE, a non-profit organization, currently has six divisions in Bedford, Massachusetts, and six divisions in McLean, Virginia. Mr. Zraket directs over 2,000 scientists, analysts and engineers in policy analysis and systems engineering, planning and research work for various departments of the U.S. federal government, for state and local agencies and for foreign governmental agencies. Major areas of work include defense command and control and communications systems, air and surface transportation, energy and resources, environmental monitoring and control, criminal justice policy analysis, management information systems, educational technology, health-care delivery systems, and civil telecommunications.

1975

Senior Vice President, Technical Operations

The MITRE Corporation

1969

Senior Vice President

MITRE/Washington Operations

1967

Vice President

MITRE/Washington Operations

1963

Technical Director

MITRE/Washington Operations

1961

Technical Director

Systems Planning and Research Division

MITRE/Bedford

1959

Associate Technical Director

Command and Control Systems Division

MITRE/Bedford

1958

Department Head, Advanced Systems

MITRE/Bedford

1952

Group Leader, Lincoln Laboratories

Massachusetts Institute of Technology

Digital Computer Division

1951

Research Staff

Massachusetts Institute of Technology

Digital Computer Laboratory

**Education**

B.S., Electrical Engineering (1951, Magna Cum Laude)

Northeastern University

M.S., Electrical Engineering (1953, Cum Laude)

Massachusetts Institute of Technology

**Professional and Honor Societies**

Fellow, I.E.E.E.; Associate Fellow and Corporate Representative, A.I.A.A.; Member, the New York Academy of Sciences, the American Association for the Advancement of Science, Tau Beta Pi, Eta Kappa Nu, and Sigma Xi.

**Public Services**

Consultant to Department of Defense, Department of Energy, National Research Council.

Trustee, Hudson Institute.

Member, Council on Foreign Relations.

Chairman of eight international Symposia on Energy, Resources and the Environment (1971-1974) in the U.S., France, Canada, Japan, Malaysia, Indonesia and the Philippines.

Chairman of the Advisory Committee on Management Information Systems for Governor King of Massachusetts.

Vice Chairman of the Governor's Council on Transportation for the Commonwealth of Virginia.

Invited Lecturer on Energy and Resources at Brookings Institute, Washington, D.C. (1974-1978).

Panel Member for Institute for Computer Sciences and Technology, Evaluation Panel for the National Bureau of Standards.

Co-Chairman of First Western Hemisphere Energy Symposium, Washington, D.C. (3-5 December 1979).

Co-Chairman of Second Western Hemisphere Energy Symposium, Rio De Janeiro, Brazil (22-26 September 1980).

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## Symposium Program

### **Publications**

Publications include invited papers and reports on Energy Resources, and the Environment; U.S. Energy Policy; Energy Resources for the Future; Technological Alternatives for Economic Development; Growth and the Conservation of Energy; Environmental Monitoring and Control; Data Processing and Control Systems for Air Traffic Control; Urban Transportation; Assessing Needs and Strategies for the Future; Multi-Modal and Short-Haul Transportation Systems Planning; Transportation in the U.S., An Appraisal; Technical, Economic and Applications Considerations for Interactive Television; Technology Assessment; Computer Systems Technology and Applications and numerous unclassified and classified publications in the areas of strategic and tactical command, control, communications and intelligence systems.